# Exhibit D

UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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GOOGLE LLC, CELLCO PARTNERSHIP D/B/A VERIZON WIRELESS,
VERIZON CORPORATE SERVICES GROUP INC.,
T-MOBILE USA, INC., SPRINT LLC F/K/A SPRINT CORP.,
AND AT&T SERVICES, INC.,

Petitioners,

v.

Headwater Research LLC,

Patent Owner.

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Case: IPR2024-00944

U.S. Patent No. 8,589,541
Issue Date: Nov. 19, 2013

Title: Device-Assisted Services for Protecting Network Capacity

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**PETITION FOR *INTER PARTES* REVIEW**

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## LIST OF EXHIBITS

| Exhibit | Description |
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| EX-1001 | U.S. Patent No. 8,589,541 ("the '541 patent") |
| EX-1002 | U.S. Patent Publication No. 2006/0039354 to Rao et al. ("Rao") |
| EX-1003 | U.S. Patent Publication No. 2010/0017506 to Fadell ("Fadell") |
| EX-1004 | U.S. Patent No. 5,987,611 to Freund ("Freund") |
| EX-1005 | U.S. Patent No. 8,028,060 to Wyld et al. ("Wyld") |
| EX-1006 | File History of U.S. Patent No. 8,589,541 (Excerpted) |
| EX-1007 | *Curriculum Vitae* of Andrew Wolfe |
| EX-1008 | *Enable-ExchangeCertificate*, Microsoft, https://learn.microsoft.com/en-us/powershell/module/exchange/enable-exchangecertificate?view=exchange-ps (last visited May 15, 2024) |
| EX-1009 | Larry L. Peterson & Bruce S. Davie, *Computer Networks: A Systems Approach* (3d ed. 2003) |
| EX-1010 | U.S. Patent Publication No. 2007/0038763 to Oestvall ("Oestvall") |
| EX-1011 | U.S. Patent Publication No. 2009/0207817 to Montemurro et al. ("Montemurro") |
| EX-1012 | Elizabeth Woyke, *World's Most Wired Airports*, NBC News (Mar. 11, 2008, 10:02 AM), https://www.nbcnews.com/id/wbna23391922 (last visited May 15, 2024) |
| EX-1013 | *Madison Avenue Calling*, Gainesville Sun (Jan. 19, 2007, 11:00 PM), https://www.gainesville.com/story/news/2007/01/20/viadison-avenue-calling/31509806007/ (last visited May 15, 2024) |
| EX-1014 | Spyros Sakellariadis, *Using Exchange Server with SMTP and POP3*, ITPro Today (May 31, 1998), https://www.itprotoday.com/email-and-calendaring/using-exchange-server-smtp-and-pop3#close-modal (last visited May 16, 2024) |
| EX-1015 | Declaration of Petitioner's Expert, Andrew Wolfe ("Wolfe Declaration") |
| EX-1016 | U.S. Patent No. 8,914,783 to Van Camp ("Van Camp") |
| EX-1017 | Eastern District of Texas Model Order Focusing on Claim and Prior Art Reduction |
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|---|---|
| EX-1020 | Defendants' Motion to Focus Patent Claims, *Headwater Research LLC v. AT&T Services, Inc.*, No. 2:23-cv-00397, ECF No. 53 (E.D. Tex. Apr. 11, 2024) |
| EX-1021 | Defendants' Motion for Entry of an Order Focusing Asserted Patent Claim and Prior Art, H*eadwater Research LLC v. T-Mobile USA, Inc.*, No. 2:23-cv-00379, ECF No. 58 (E.D. Tex. Apr. 30, 2024) |
| EX-1022 | Defendants' Motion for Entry of an Order Focusing Asserted Patent Claim and Prior Art, *Headwater Research LLC v. Verizon Communications Inc.*, No. 2:23-cv-00352, ECF No. 63 (E.D. Tex. May 1, 2024) |

# CLAIM LISTINGS

## Independent Claim 1

| | |
|---|---|
| **[1a]** | A non-transitory computer-readable storage medium storing machine-executable instructions that, when executed by one or more processors of a wireless end-user device, cause the one or more processors to: |
| **[1b]** | identify a service usage activity of the wireless end-user device, the service usage activity being associated with a first software component of a plurality of software components on the wireless end user device, |
| **[1c]** | the service usage activity comprising one or more prospective or successful communications over a wireless network; |
| **[1d]** | determine whether the service usage activity comprises a background activity; |
| **[1e]** | determine at least an aspect of a policy based on a user input obtained through a user interface of the wireless end-user device or based on information from a network element, |
| **[1f]** | the policy to be applied if the service usage activity is the background activity, the policy at least for controlling the service usage activity; and |
| **[1g]** | if it is determined that the service usage activity is the background activity, apply the policy. |

## Dependent Claim 24

| | |
|---|---|
| **24** | The non-transitory computer-readable storage medium recited in claim 1, wherein the network element is communicatively coupled to the wireless end-user device over the wireless network. |

## Dependent Claim 25

| | |
|---|---|
| **25** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on an amount of time, a time of day, a day of a week, a schedule, a network busy state, a network performance state, a network quality-of-service state, a priority of the service usage activity, or a combination of these. |

## Dependent Claim 27

| | |
|---|---|
| **27** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on at least an aspect of a service plan. |

**Dependent Claim 28**

| | |
|---|---|
| **28** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on a behavior of the first software component, a behavior of the service usage activity, a messaging layer behavior, a random back-off, a power state of the wireless end-user device, a usage state of the wireless end-user device, or a combination of these. |

**Dependent Claim 29**

| | |
|---|---|
| **29** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on a user interaction with the first software component, a user interaction with the service usage activity, a user interaction with the wireless end-user device, a user interface priority of the service usage activity, or a combination of these. |

**Dependent Claim 30**

| | |
|---|---|
| **30** | The non-transitory computer-readable storage medium recited in claim 1, wherein the wireless end-user device is part of a device group, and wherein the policy is associated with the device group. |

**Dependent Claim 31**

| | |
|---|---|
| **31** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on a type of the wireless network. |

**Dependent Claim 32**

| | |
|---|---|
| **32** | The non-transitory computer-readable storage medium recited in claim 31, wherein the type of the wireless network is cellular, 2G, 3G, 4G, home, roaming, wireless fidelity (WiFi), or a combination of these. |

**Dependent Claim 33**

| | |
|---|---|
| **33** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on a roaming condition of the wireless end-user device, a cost associated with communicating over the wireless network, or a combination of these. |

**Dependent Claim 34**

| | |
|---|---|
| **34** | The non-transitory computer-readable storage medium recited in claim 1, wherein controlling the service usage activity comprises preventing the first software component from launching, executing, or running. |

**Dependent Claim 35**

| | |
|---|---|
| **35** | The non-transitory computer-readable storage medium recited in claim 1, wherein the at least an aspect of the policy is based on the user input obtained through the user interface of the wireless end-user device, and wherein the user input identifies the first software component or the service usage activity. |

**Dependent Claim 36**

| | |
|---|---|
| **[36a]** | The non-transitory computer-readable storage medium recited in claim 1, wherein the at least an aspect of the policy is based on the user input obtained through the user interface of the wireless end-user device, and |
| **[36b]** | wherein the user input identifies a network parameter or a network type. |

**Dependent Claim 37**

| | |
|---|---|
| **37** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on a usage limit or a threshold. |

**Dependent Claim 38**

| | |
|---|---|
| **[38a]** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on a limit, |
| **[38b]** | wherein the limit is based on the user input obtained through the user interface of the wireless end-user device, a user preference, an indication of a threshold, a total traffic, a type of traffic, a destination, a port, a frequency of access, an access behavior, or a combination of these. |

**Dependent Claim 39**

| | |
|---|---|
| **39** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is based on a type of the service usage activity, a priority of the service usage activity, a duration of the service usage activity, a characteristic of the wireless network, a quality-of-service (QoS) rule associated with the service usage activity, or a combination of these. |

**Dependent Claim 40**

| | |
|---|---|
| **40** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy comprises one or more filters, wherein the one or more filters provide filtering based on: a characteristic of the wireless network, a service plan applicable to the wireless end-user device, a characteristic of the first software component, a time of day, a network busy state, or a combination of these. |

**Dependent Claim 61**

| | |
|---|---|
| **61** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in: blocking access to the wireless network, restricting access to the wireless network, delaying access to the wireless network, or aggregating and holding the service usage activity. |

**Dependent Claim 62**

| | |
|---|---|
| **62** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in queuing, time-windowing, suspending, quarantining, killing, or removing the service usage activity. |

**Dependent Claim 65**

| | |
|---|---|
| **[65a]** | The non-transitory computer-readable storage medium recited in claim 1, wherein the information from the network element is first information, and |
| **[65b]** | wherein apply the policy comprises provide second information to the first software component. |

**Dependent Claim 66**

| | |
|---|---|
| **66** | The non-transitory computer-readable storage medium recited in claim 65, wherein provide second information to the first software component comprises provide the second information through an application programming interface. |

**Dependent Claim 67**

| | |
|---|---|
| **67** | The non-transitory computer-readable storage medium recited in claim 65, wherein, when executed by the one or more processors of the wireless end-user device, the machine-executable instructions further cause the one or more processors to:<br><br>provide third information to a second software component on the wireless end-user device, the third information being different from the second information. |

**Dependent Claim 68**

| | |
|---|---|
| **68** | The non-transitory computer-readable storage medium recited in claim 67, wherein provide third information to a second software component on the wireless end-user device comprises provide the third information through an application programming interface. |

**Dependent Claim 69**

| | |
|---|---|
| **69** | The non-transitory computer-readable storage medium recited in claim 67, wherein the third information enables the second software component to communicate over the wireless network. |

**Dependent Claim 70**

| | |
|---|---|
| **[70a]** | The non-transitory computer-readable storage medium recited in claim 65, wherein the wireless network is a first wireless network, and |
| **[70b]** | wherein the second information comprises a network access condition of the first wireless network, a network busy state associated with the first wireless network, a network availability state associated with the first wireless network, a network busy state associated with a second wireless network, a network availability state associated with the second wireless network, or information about the policy. |

**Dependent Claim 71**

| | |
|---|---|
| **71** | The non-transitory computer-readable storage medium recited in claim 65, wherein the second information comprises a setting for assisting the first software component in restricting, allowing, blocking, throttling, deferring, time-scheduling, or queuing the service usage activity. |

**Dependent Claim 72**

| | |
|---|---|
| **72** | The non-transitory computer-readable storage medium recited in claim 71, wherein the setting is based on a characteristic of the wireless network, a network busy state associated with the wireless network, a time, a service plan associated with the wireless end-user device, a classification of the service usage activity, or a combination of these. |

**Dependent Claim 73**

| | |
|---|---|
| **73** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises inform the first software component whether the first software component is allowed to access the wireless network. |

**Dependent Claim 74**

| | |
|---|---|
| **74** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises inform the first software component whether the wireless network is available. |

**Dependent Claim 75**

| | |
|---|---|
| **75** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises inform the first software component of a traffic control to be implemented or applied by the first software component. |

**Dependent Claim 76**

| | |
|---|---|
| **[76a]** | The non-transitory computer-readable storage medium recited in claim 1, wherein the information from the network element is first information, and |
| **[76b]** | wherein apply the policy comprises obtain second information from the first software component. |

**Dependent Claim 77**

| | |
|---|---|
| **77** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in intercepting, controlling, blocking, modifying, removing, or replacing a notification associated with the first software component or the service usage activity, the notification for presentation through a user interface of the wireless end-user device. |

**Dependent Claim 78**

| | |
|---|---|
| **78** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in intercepting, controlling, blocking, modifying, removing, or replacing a notification for presentation through a user interface of the wireless end-user device. |

**Dependent Claim 79**

| | |
|---|---|
| **79** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in intercepting a stack application programming interface (API) level or application messaging layer request. |

**Dependent Claim 80**

| | |
|---|---|
| **80** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in killing or suspending the service usage activity or the first software component. |

**Dependent Claim 81**

| | |
|---|---|
| **81** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in changing or setting a priority of the service usage activity. |

**Dependent Claim 82**

| | |
|---|---|
| **82** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in emulating a network application programming interface (API) message. |

**Dependent Claim 83**

| | |
|---|---|
| **83** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises at least assist in intercepting, modifying, blocking, removing, injecting, swapping, or replacing an application interface message. |

**Dependent Claim 84**

| | |
|---|---|
| **[84a]** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises:<br><br>at least assist in preventing initiation of the service usage activity by the first software component; and |
| **[84b]** | send a message to the first software component. |

**Dependent Claim 85**

| | |
|---|---|
| **85** | The non-transitory computer-readable storage medium recited in claim 84, wherein initiation of the service usage activity by the first software component comprises opening of a connection, opening of a socket, initiating transmission, initiating a data flow, or initiating a data stream. |

**Dependent Claim 86**

| | |
|---|---|
| **86** | The non-transitory computer-readable storage medium recited in claim 84, wherein the message comprises a reset message, an indication that the service usage activity is not allowed, or an indication that the wireless network is not available. |

**Dependent Claim 87**

| | |
|---|---|
| **87** | The non-transitory computer-readable storage medium recited in claim 1, wherein apply the policy comprises:<br>identify a socket to be opened for the service usage activity; and<br>based on a condition, block the service usage activity or terminate the socket. |

**Dependent Claim 88**

| | |
|---|---|
| **88** | The non-transitory computer-readable storage medium recited in claim 1, wherein controlling the service usage activity comprises: blocking a network access event or attempt associated with the first software component, modulating a number of access events or attempts associated with the first software component, aggregating a plurality of access events or attempts associated with the first software component, or time-windowing the number of access events or attempts associated with the first software component. |

**Dependent Claim 89**

| | |
|---|---|
| **89** | The non-transitory computer-readable storage medium recited in claim 1, wherein, when executed by the one or more processors of the wireless end-user device, the machine-executable instructions further cause the one or more processors to:<br><br>if it is determined that the service usage activity is not the background activity, refrain from applying the policy. |

**Dependent Claim 90**

| | |
|---|---|
| **90** | The non-transitory computer-readable storage medium recited in claim 1, wherein the policy is a first policy, and wherein, when executed by the one or more processors of the wireless end-user device, the machine-executable instructions further cause the one or more processors to:<br><br>if it is determined that the service usage activity is not the background activity, apply a second policy. |

**Dependent Claim 153**

| | |
|---|---|
| **[153a]** | The non-transitory computer-readable storage medium recited in claim 1, wherein the at least an aspect of a policy is based on the user input obtained through the user interface of the wireless end-user device, and |
| **[153b]** | wherein the user input specifies a user preference associated with one or more network types. |

**Dependent Claim 154**

| | |
|---|---|
| **154** | The non-transitory computer-readable storage medium recited in claim 153, wherein the one or more network types comprise wireless fidelity (WiFi), home, roaming, 4G, 3G, wireless, wired, or a combination of these. |

**Dependent Claim 172**

| | |
|---|---|
| **172** | The non-transitory computer-readable storage medium recited in claim 1, wherein the network element comprises a service controller, a server, a cloud element, or a billing element. |

**Dependent Claim 173**

| | |
|---|---|
| **173** | The non-transitory computer-readable storage medium recited in claim 1, wherein, when executed by the one or more processors of the wireless end-user device, the machine-executable instructions further cause the one or more processors to provide information about the service usage activity to the network element. |

**Dependent Claim 174**

| | |
|---|---|
| **174** | The non-transitory computer-readable storage medium recited in claim 173, wherein the information about the service usage activity comprises a count of data traffic associated with the service usage activity, a transaction count, a message count, a connection time, a connection duration, a classification of traffic, an indication that a measure of the service usage activity satisfies a condition relative to a threshold, a parameter associated with the service usage activity, an indication that the background activity is restricted, or a combination of these. |

# I. INTRODUCTION

Petitioners request *inter partes* review ("IPR") of claims 1, 24-25, 27-40, 61-62, 65-90, 153-154, and 172-174 of U.S. Patent No. 8,589,541.

# II. STANDING

Petitioners are not barred or estopped from requesting IPR on these grounds.

# III. RELIEF REQUESTED

| Grounds | |
|---|---|
| 1 | Rao anticipates and/or renders obvious claims 1, 24-25, 28, 34-35, 39, 61-62, 79-83, 87-90, and 172-174. |
| 2 | Rao in view of Fadell renders obvious claims 1, 27, 30-33, 36-38, 40, 65-78, and 153-154. |
| 3 | Rao in view of Freund renders obvious claims 29 and 84-86. |

# IV. THE '541 PATENT

## A. Overview

The '541 patent discloses "differentially controlling . . . network service usage activities" based on "the type of service activity requesting network access." EX-1001, 15:13-18. A service usage control policy is applied "to protect network capacity." *Id.*, 18:8-19:58. If a service usage activity is classified as a background activity, the control policy may assign it a priority. *Id.*, 18:8-20:43.

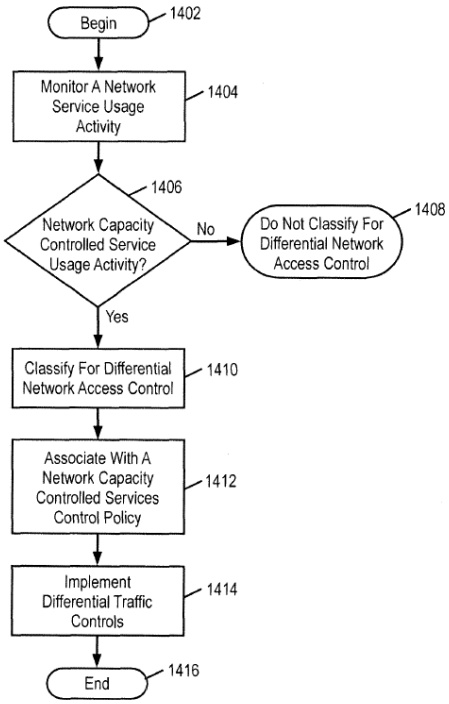


FIG. 14

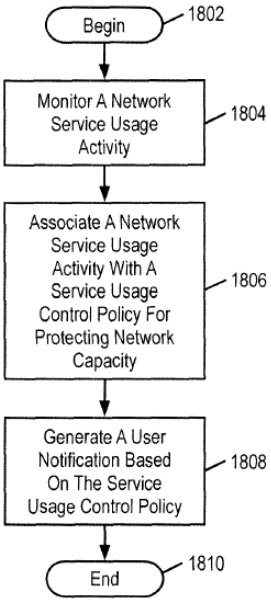


FIG. 18

*Id.*, Figs. 14, 18.

### B. Prosecution History

The original claims were rejected. EX-1006, 192-214, 579-84. The applicant rewrote the independent claim and added 173 new dependent claims. *Id.*, 647-701. With an Examiner's amendment, the Examiner allowed all 174 claims. *Id.*, 744-56.

### C. POSITA

A POSITA at the time of the invention would have at least a bachelor's degree in computer science, computer engineering, or a similar field, and approximately two years of industry or academic experience in a field related to computer software development and/or computer networking. EX-1015 ¶¶50-52. Work experience can

substitute for education, and additional education can substitute for work experience. *Id.*

## V. CLAIM CONSTRUCTION

No terms require construction to resolve this Petition.

## VI. PRIOR ART

### A. Rao

Rao discloses remote access client 120 that intercepts inbound or outbound network packets associated with applications of client 105. Rao ¶¶38-43, 99-110, 184-86. Intercepted packets are queued according to priority policies. *Id.* ¶¶38-46, 80, 184-94. Rao prioritizes by criteria, including by application and whether the application is "running in the foreground or the background." *Id.* ¶¶182, 188-93.

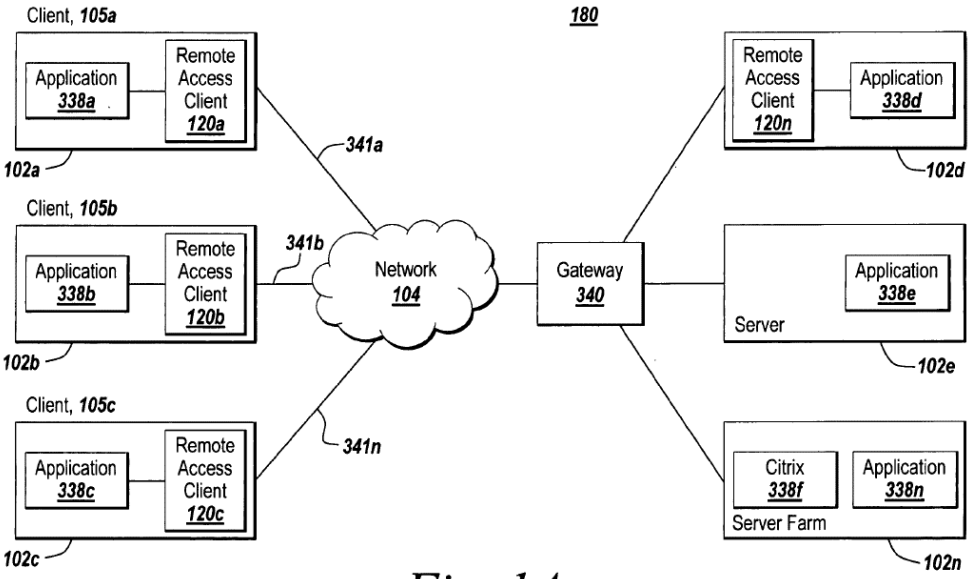


*Fig. 1A*

*Id.*, Fig. 1A.

Rao describes some of its disclosures as "embodiments," but invites a POSITA to combine them. *Id.* ¶¶218-19; *id.* ¶¶74, 131. A POSITA would have therefore understood Rao to disclose various aspects of a single system. EX-1015 ¶¶56-59. A POSITA also would have been motivated and found it obvious to combine Rao's "embodiments" in view of Rao's express invitation and taught benefits. *Id.*

**B. Fadell**

Fadell discloses controlling network usage. Fadell ¶¶16-17. Resource utilization component 110 monitors "utilization," provides alerts, and "performs utilization shifting" to manage data/bandwidth consumption. *Id.*

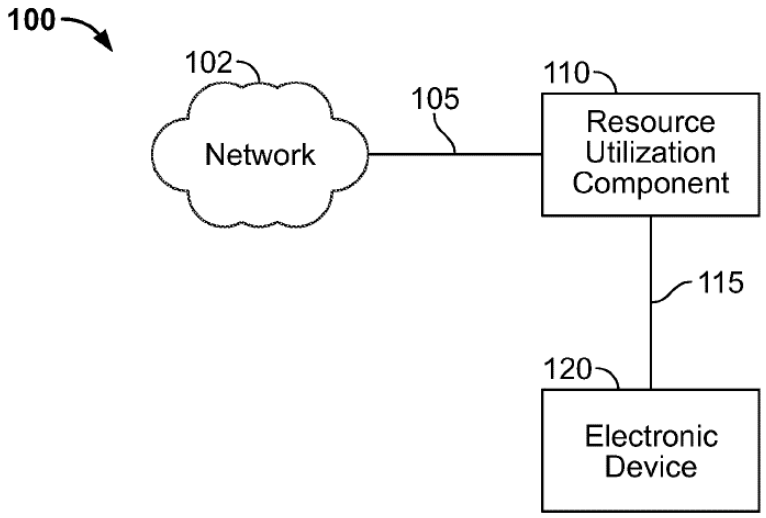


**FIG. 1**

*Id.*, Fig. 1.

Fadell gives users notices, including the following, providing service plan information and options to purchase resources, limit use, and/or switch networks. *Id.* ¶¶17-29, 50-70.

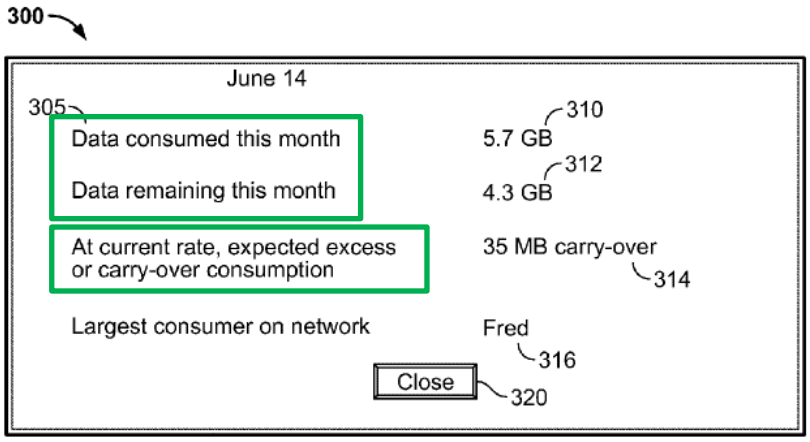


FIG. 3

*Id.*, Fig. 3 (annotated).

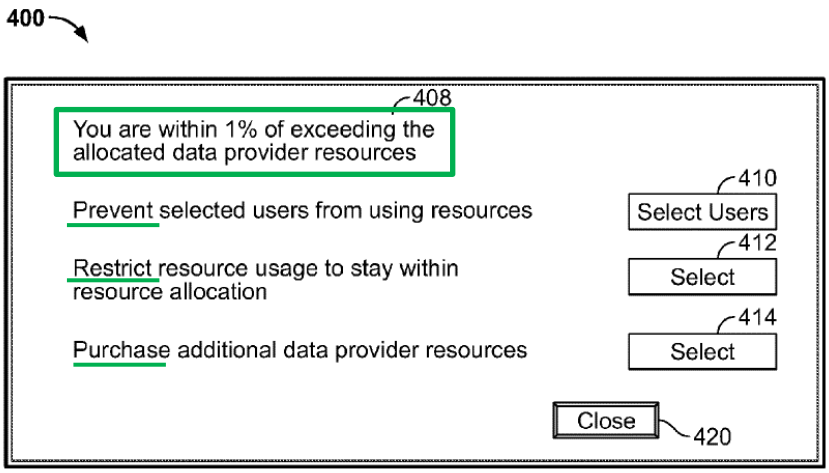


FIG. 4

*Id.*, Fig. 4 (annotated).

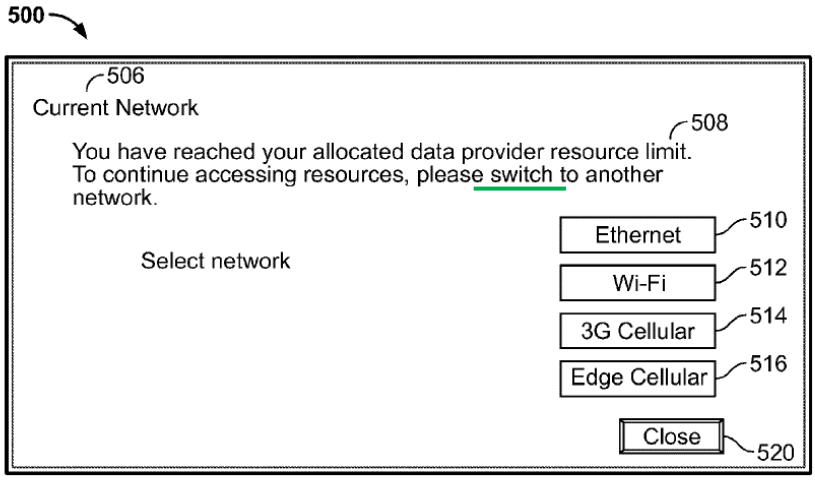


FIG. 5

*Id.*, Fig. 5 (annotated).

### C. Freund

Freund's client monitor application 311 intercepts, monitors, logs, and filters network communications associated with applications. Freund, 1:58-3:59, 13:23-15:30. Access rules with specified application criteria govern Internet access. *Id.*, 3:60-4:28. The monitor restricts rule-violating network traffic by, e.g. "denying Internet access" or "issu[ing] a warning." *Id.*, 4:26-5:64, 19:57-60, 21:12-20.

## VII. Ground 1: Rao Anticipates and/or Renders Obvious Claims 1, 24-25, 28, 34-35, 39, 61-62, 79-83, 87-90, and 172

Rao anticipates most of the limitations discussed under this Ground for the reasons provided below. Rao renders these same limitations obvious for the same reasons. Rao also renders obvious the remaining limitations discussed under this Ground.

## A. Claim 1

### 1. [1a] "A non-transitory computer-readable storage medium storing machine-executable instructions that, when executed by one or more processors of a wireless end-user device, cause the one or more processors to:"

To the extent the preamble is limiting, Rao discloses "computing device 102" of client 105 ("wireless end-user device") that includes a non-volatile "main memory unit" ("non-transitory computer-readable storage medium") and a "central processing unit" ("one or more processors"). Rao ¶¶118-25, 99-100, 130, 79-116, 83-84, Figs. 1A-1E. Computing device 102 includes storage device 128 storing remote access client software 120. *Id.* ¶124, Fig. 1D. Rao's memory and/or storage device stores instructions the CPU executes. *Id.* ¶¶116, 119, 124; EX-1015 ¶¶68-73.

### 2. [1b] "identify a service usage activity of the wireless end-user device, the service usage activity being associated with a first software component of a plurality of software components on the wireless end-user device,"

Rao discloses service usage activity: network packets communicated via network 104, which may be a wireless network. Rao ¶¶41-46, 52, 101-16; EX-1015 ¶¶74-75, 83; *also* EX-1001, 19:8-37. The network packets are associated with "a first software component" of many: "***one or more applications 338a-338n***, which access the network 104" and provide "real-time data communications." Rao ¶¶179-95, 87-91; EX-1015 ¶77. Each application is or includes a software component on the wireless end-user device. Rao ¶¶184, 188; EX-1015 ¶76.

Rao discloses identifying a service usage activity associated with the software components because it teaches "intercepting" the network packets, "storing" the network packets, and "inspecting" the network packets to associate an application with the network packets. EX-1015 ¶78.

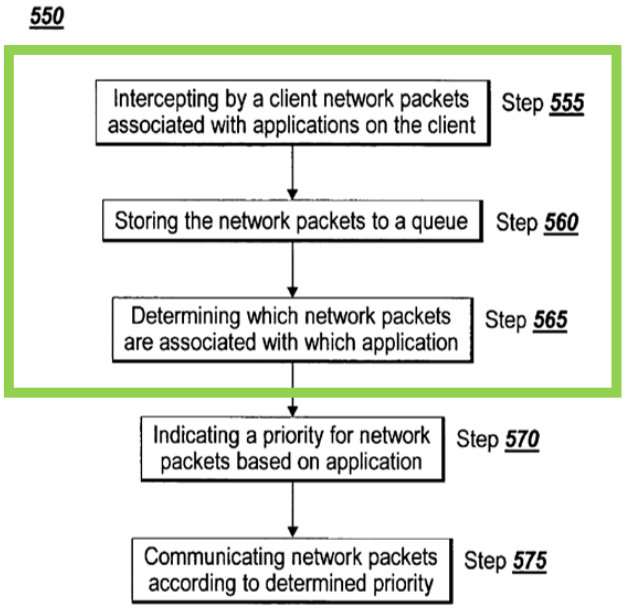


*Fig. 5B*

Rao, Fig. 5B (annotated).

Filter 322 "***intercept[s]*** any of the network traffic . . . such as network packets associated with the application 338" to route the packets. *Id.* ¶¶99, 101-16, 179-81, Fig. 1C, 5A; EX-1015 ¶¶78-79.

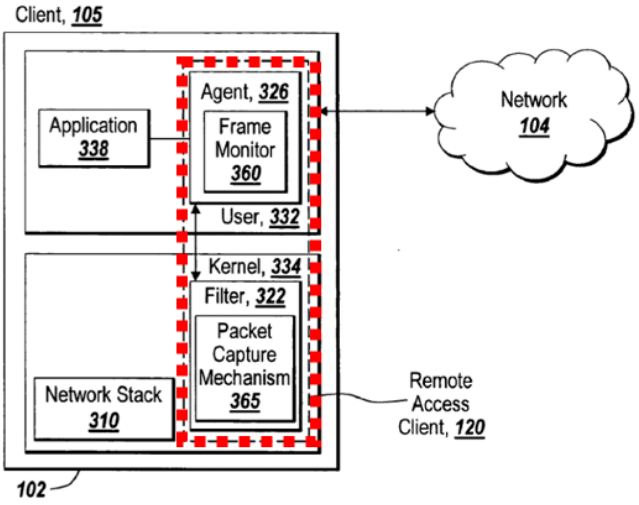


*Fig. 1C*

Rao, Fig. 1C (annotating remote access client 120).

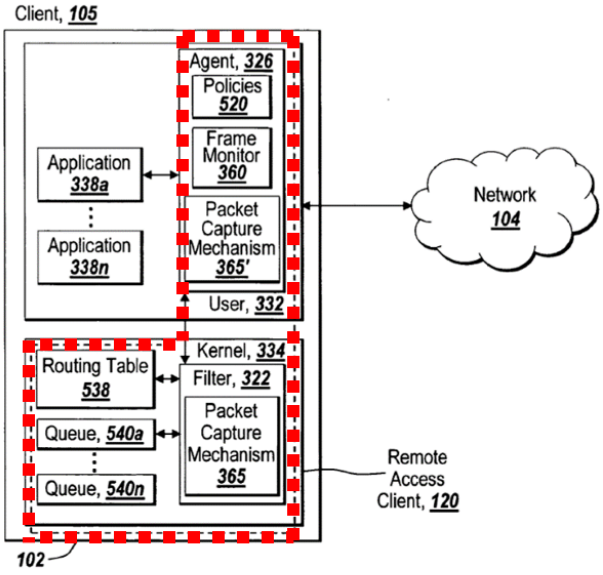


*Fig. 5A*

*Id.*, Fig. 5A (annotating remote access client 120).

Rao further ***stores*** intercepted packets in a queue, *id.* ¶¶186, 180-84, 191-93, Fig. 5C, and filter 322 "can ***inspect*** the contents of the packets" to, e.g., identify the

network or verify the application(s) that generated the packets, *id.* ¶¶102-07, 186-87; EX-1015 ¶¶80-82. Based on this inspection, "agent 326 identifies the network packet as generated from an application 338*a*-338*n* by any of the content of the network packet" (e.g., "headers, fields, or the type and content of data"). Rao ¶187. Agent 326 may inspect the packet and "verify that the identified application actually generated the packet." *Id.* ¶187; *id.* ¶¶105-09, 187. Agent 326 may associate the packet "with an application 338*a*-338*n* by matching information from the routing table 538." *Id.* ¶187; EX-1015 ¶81. Rao teaches "indicating" a priority for the packets based on the associated application (step 570), confirming that they are identified as claimed. Rao, Fig. 5B; EX-1015 ¶82.

Intercepting, storing, and inspecting a network packet is (or requires) identifying the network packet; this understanding is consistent with the '541 patent. *E.g.*, EX-1001, 69:5-35, 70:57-71:3, 72:22-28, 87:54-65, 96:66-97:54, Figs. 14, 18, claims 8, 17 (describing similar activities, e.g., "packet inspection" as "identifying"); EX-1015 ¶82.

**3. [1c] "the service usage activity comprising one or more prospective or successful communications over a wireless network;"**

Rao's network packets disclose "service usage activity comprising . . . communications over a wireless network."

Remote access client 120 intercepts in-and-outbound network traffic associated with applications 338*a*-338*n* of client 105, which is "connected to network 104." Rao ¶¶110, 179-80, 185 ("obtain inbound and/or outbound packets of the client 105, such as the network traffic associated with application 338"); *id.* ¶¶125, 195 (describing wireless interfaces/connections).

Rao's intercepting, inspecting, and/or storing packets in queues ***before*** communicating them from the queues discloses identifying one or more ***prospective*** communications. *Id.* ¶¶184-86, 105, 110-11, 180, 194-95; EX-1015 ¶¶84-86.

Intercepting "inbound . . . [packets] . . . associated with application 338" discloses identifying one or more ***successful*** communications over a wireless network. Rao ¶184; EX-1015 ¶86. Communicating outbound network packets from the queues also discloses successful communications. Rao ¶¶189-95, Figs. 1A-C, 5A; EX-1015 ¶86.

#### 4. [1d] "determine whether the service usage activity comprises a background activity;"

After intercepting, Rao's remote access client 120 "***determines*** the association of network packets with applications 338*a*-338*n* in order to determine priorities and apply any priority based policies 520." Rao ¶187; EX-1015 ¶87. This includes "***determin[ing]*** whether the application 338*a*-338*n* associated with the network packet is running in the foreground or the background of the client 105." Rao ¶¶188,

38-41, 182. This determination is made during step 565, when network packets are associated with an application. *Id.* ¶¶187-88; EX-1015 ¶¶87-88.

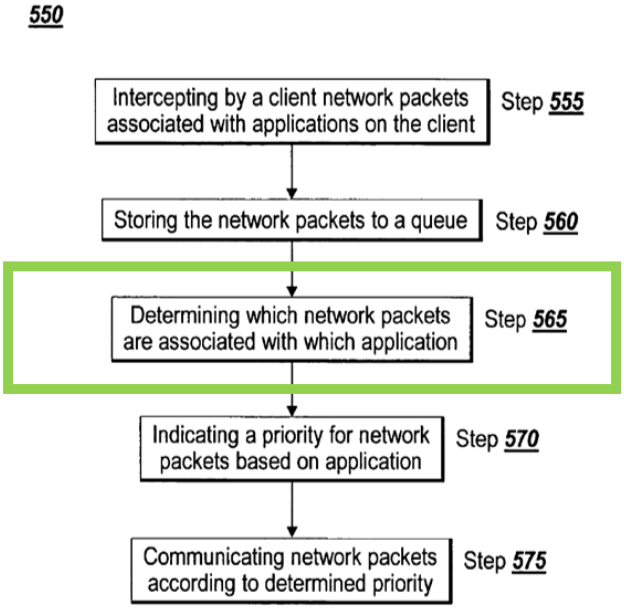


*Fig. 5B*

Rao, Fig. 5B (annotated).

By determining whether network packets are associated with an application "running in the background," Rao determines whether the associated service usage activity "comprises a background activity," *id.* ¶¶41, 188, and therefore determines whether the service usage activity associated with a first software component comprises a background activity, EX-1015 ¶89.

Determining whether an activity is a background activity was well known, as Rao discloses, and the methodology for making that determination would have been

a simple design choice among finite, known options, for which a POSITA would have had a reasonable expectation of success. *Id.* ¶90.

**5. [1e] "determine at least an aspect of a policy based on a user input obtained through a user interface of the wireless end-user device or based on information from a network element,"**

Rao discloses remote access client 120 may include "***one or more policies 520*** [a policy] for specifying client-side prioritization of network communications related to applications 338*a*-338*n*." Rao ¶182. Rao's prioritization is a policy, and the specific priority assigned to intercepted packets is an aspect of that policy. EX-1015 ¶¶91-92, 95; Rao ¶¶38-43, 180, 182.

Policies 520 may be "provided by or downloaded [to agent 326] ***via the gateway 340***" (a network element) over network 104. Rao ¶183; *id.* ¶¶87, 90-96 ("communicat[ing] over the network 104 to the gateway 340"). Accordingly, the policy would be based on information from a network element. EX-1015 ¶93.

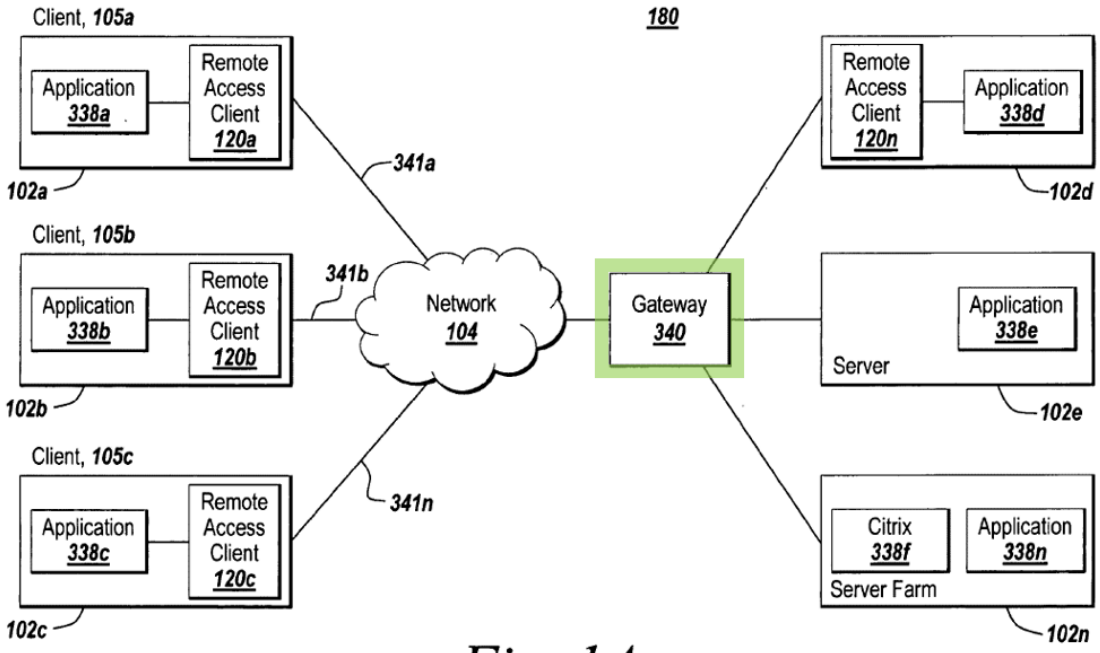


*Fig. 1A*

Rao, Fig. 1A (annotated).

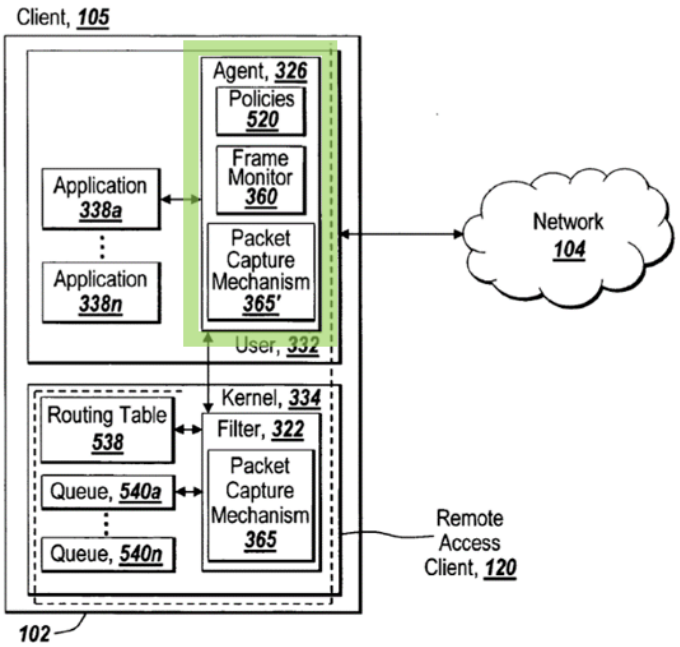


*Fig. 5A*

*Id.*, Fig. 5A (annotated).

Further, a user may "configur[e]" an aspect of a policy through "***a user interface, graphical or otherwise, design[ed] and constructed for configuring or specifying the policies 520***." *Id.* ¶183; EX-1015 ¶94.

If Rao does not expressly disclose determining at least an aspect of the policy, Rao renders this obvious. Rao emphasizes prioritization on an application-by-application basis, Rao ¶¶182, 191, and a POSITA would therefore have been motivated to obtain information from the network or the user to determine the prioritization to be applied (both generally and to the specific application and associated packets) to implement the system as Rao suggests, EX-1015 ¶96; Rao ¶184.

**6. [1f] "the policy to be applied if the service usage activity is the background activity, the policy at least for controlling the service usage activity; and"**

Rao's policies 520 may "define [packet] prioritization based on ***whether*** an application is running in the ***foreground or the background***." Rao ¶¶182, 188-89, 40-42, 193 ("packets may be further prioritized by the ***characteristic of the application*** . . . , e.g., a ***foreground application***"). "The policies 520 may be specified ***conditionally***," so that no policy applies to some packets, and packets associated with different applications may have higher or lower priority. *Id.* ¶¶182, 193; EX-1015 ¶¶97-99.

Rao therefore discloses conditional policies based on whether the application (and, as a POSITA would have understood, its associated network communication/service usage activity) is background activity. EX-1015 ¶100. By defining prioritization based on whether an application is running in the background (e.g., assigning specific priority to the service usage activity associated with the application), Rao discloses its policy is to be applied if the service usage activity is the background activity. *Id.* The policy "controls" the service usage activity by prioritizing and communicating the packets "according to the determined priority." Rao ¶¶189-95, 40-41, Fig. 5B (steps 570, 575); EX-1015 ¶¶100-01.

Alternatively, these disclosures at least render obvious applying prioritization (the policy) to queued packets "if" they are associated with background applications such as background service usage activity (e.g., for remote access client 120 to focus on deprioritizing background applications associated with background service usage activity). Rao ¶¶182, 188-89, 193, 40-42; EX-1015 ¶¶102-03. This would have improved Rao and furthered its objectives of, e.g., reducing network congestion, improving bandwidth available to foreground applications, and improving system speed/efficiency by assigning background activity, including unnecessary/unwanted/unknown activity, a lower priority than actively used applications. Rao ¶¶3, 80, 184; EX-1015 ¶¶104-05.

### 7. [1g] "if it is determined that the service usage activity is the background activity, apply the policy."

Rao assigns priority to network packets associated with background activity (service usage activity determined to be background activity) and transmits those packets according to that priority, thus applying the policy. EX-1015 ¶¶106-09.

"[A]gent 326 uses the policies 520 to ***apply a priority*** to network packets of applications 338*a*-338*n* in accordance with the prioritization rules specified or indicated by the policies 520," including those based on "characteristics . . . such as running in the foreground or ***background***, to indicate priority for a network packet of the application." Rao ¶189, Fig. 5 (Step 570). Agent 326 then "indicates the priority to the filter 322 . . . ***to apply*** the indicated priorities." *Id.* ¶¶189-93; EX-1015 ¶108. The packets are communicated "according to the determined priorities." Rao ¶¶194-95, Fig. 5 (Step 575); EX-1015 ¶108.

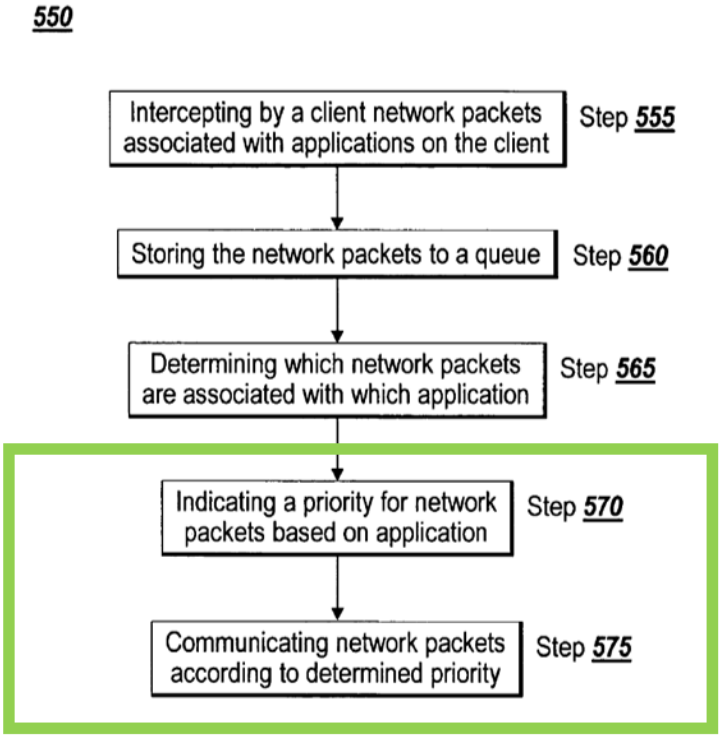


*Fig. 5B*

Rao, Fig. 5B (annotated).

At minimum, Rao renders obvious applying a policy ***if*** it is determined the service usage activity is the background activity for the reasons discussed. *Supra* [1f]; EX-1015 ¶110. For example, applying prioritization (e.g., lower priority) to queued packets received from background applications would further Rao's objectives, and a POSITA would have been motivated to do so. *Supra* [1f]; Rao ¶¶3, 80, 184; EX-1015 ¶110.

**B. Claim 24**

**1. "... claim 1, wherein the network element is communicatively coupled to the wireless end-user device over the wireless network."**

Client 105 (the wireless end-user device) and gateway 340 (the network element) are communicatively coupled over wireless network 104. *Supra* [1e], [1c]; EX-1015 ¶¶189-91.

**C. Claim 25**

**2. "... claim 1, wherein the policy is based on ... a priority of the service usage activity, ...."**

Rao's policies assign specific priorities (an aspect of the policy) to intercepted packets, and therefore the policy is based on a priority of the service usage activity. *Supra* [1e], [1c]; EX-1015 ¶¶192-94; Rao ¶¶41, 46, 184-93.

**D. Claim 28**

**1. "... claim 1, wherein the policy is based on a behavior of the first software component, ...."**

The '541 patent describes "application behavior[s]" as including "conference meeting services, video streaming, content update[s], software update[s], and/or other similar application behavior[s]." EX-1001, 14:44-47. Rao similarly characterizes "type[s] of application[s]" by their "behavior" as that term is used in the '541 patent. Rao ¶192 ("email or voice application[s]" are "type[s] of application[s]"); EX-1015 ¶¶197-200. Rao's policies are based on the types of applications, i.e., their behaviors. Rao ¶¶182, 179, 184, 191-93.

Rao also queues and prioritizes applications based on whether they are in the foreground or background (also behaviors), *id.* ¶182, and to the extent these embodiments are distinct, a POSITA would have been motivated to combine them based on Rao's express invitation, EX-1015 ¶¶66-67. This would have improved control over queuing and been an exercise of routine skill. *Id.*

### E. Claim 34

#### 1. "**. . . claim 1, wherein controlling the service usage activity comprises preventing the first software component from . . . executing, or running.**"

Rao arranges "intercepted network packets" in a "***packet by packet prioritization*** across all applications 338*a*-338*n*" based on policies 520. Rao ¶191. The packets are "organized into priority queues 540*a*-540*b*" and communicated according to priority. *Id.* ¶194. Rao's policies also determine whether packets should be queued or "discard[ed]." *Id.* ¶¶207, 102.

A POSITA would have been motivated and found it routine to combine Rao's prioritization and discarding disclosures to identify queued packets to discard during network disruptions, thereby improving network efficiency. EX-1015 ¶¶201-05; Rao ¶218. This prevents lower-priority applications (software components) from executing or running (e.g., by discarding packets that would allow their processes to be executed and inbound packets that would otherwise cause their processes to run) and thus teaches claim 34. EX-1015 ¶¶201-05; Oestvall ¶¶15, 23. Rao's teachings

related to discarding apply in addition to policies defining "prioritization" and do not impact prioritization, Rao ¶182; *supra* [1a]-[1g], and to the extent these embodiments are distinct, a POSITA would have been motivated to combine them in view of Rao's express invitation, EX-1015 ¶¶201-05. This allows more granular control over queuing and would have been a routine exercise. *Id.*

### F. Claim 35

#### 1. "**. . . claim 1, wherein the at least an aspect of the policy is based on the user input obtained through the user interface of the wireless end-user device, and wherein the user input identifies the first software component . . . .**"

Rao discloses an aspect of the policy is based on user input obtained through the user interface. *Supra* [1e]. Rao also discloses that the user input identifies the first software component because it "specif[ies] the priority of [a] first application or [a] second application," which requires it to identify an application and thus a first software component. *Id.* ¶¶42, 46; EX-1015 ¶¶206-08.

### G. Claim 39

#### 1. "**. . . claim 1, wherein the policy is based on . . . a priority of the service usage activity . . . .**"

*Supra* claim 25; EX-1015 ¶209; *also* Rao ¶¶41, 46, 179-80, 182, 184-93.

### H. Claim 61

#### 1. "**. . . claim 1, wherein apply the policy comprises at least assist in: . . . <u>delaying access to the wireless network</u>, or <u>aggregating and holding the service usage activity</u>.**"

In Rao, lower priority packets are communicated later, delaying access to the network. *Supra* [1f]-[1g]; EX-1015 ¶¶239-40. Rao's "storing and/or arranging network packets" in lower-priority queues teaches "aggregating and holding" network packets (the service usage activity). Rao ¶¶180, 40, 191; EX-1015 ¶241.

### I. Claim 62

#### 1. "**. . . claim 1, wherein apply the policy comprises at least assist in <u>queuing</u> . . . .**"

Rao's policy includes queuing packets. *Supra* [1f]-[1g]; EX-1015 ¶¶242-43; Rao ¶¶189-95, 38, 43.

### J. Claim 79

#### 1. "**. . . claim 1, wherein apply the policy comprises at least assist in intercepting a stack application programming interface (API) level or application messaging layer request.**"

Rao's filter 322 "appl[ies] the . . . priorities" to the network packets (i.e., applies the policy). *Supra* [1f]-[1g]; Rao ¶¶189-93; EX-1015 ¶¶252-57. Rao's agent 326 communicates the priorities to the filter via an API. Rao ¶¶190, 106. This communication requires the filter to send a call (i.e., request) to the agent 326 through the API to transmit the priorities. EX-1015 ¶¶252-57.

Because the filter is a "network driver" operating on a "layer . . . of a network stack 310," Rao ¶101, the filter's request to the agent would constitute a "stack application programming interface (API) level" request, as described in the '541 patent. EX-1015 ¶¶252-57; EX-1001, 16:38-45.

The agent must intercept (or assist in intercepting) the filter's stack API level request so that the agent can return the priorities to the filter. EX-1015 ¶¶252-57; Rao ¶¶116 (explaining the agent and filter are applications), 88 (providing examples of APIs incorporated into applications); EX-1015 ¶¶252-57 (explaining that Rao's exemplary APIs include callback functions that at least assist in intercepting stack API level requests); Wyld, 7:36-40.

### K. Claim 80

#### 1. "**. . . claim 1, wherein apply the policy comprises at least assist in killing or suspending the service usage activity . . .**"

Rao delays (queues) or discards network packets. *Supra* claim 34. Delaying (queuing) or discarding network packets constitutes suspending or killing the service usage activity, respectively. EX-1015 ¶¶258-61; Rao ¶¶194, 207.

### L. Claim 81

#### 1. "... claim 1, wherein apply the policy comprises at least assist in changing or setting a priority of the service usage activity."

Rao's applying priorities to network packets constitutes assisting in changing or setting a priority of the service usage activity. *Supra* [1g], [1e]; EX-1015 ¶¶262-65; Rao ¶¶189-90.

### M. Claim 82

#### 1. "... claim 1, wherein apply the policy comprises at least assist in emulating a network application programming interface (API) message."

Rao's network capacity control is "transparent[]" to its applications and client such that the impacted service usage activities are unaware of the network capacity control. Rao ¶¶41, 46, 52, 57; EX-1015 ¶¶266-69. Rao's client provides a false acknowledgement of receipt of a lossless protocol packet. Rao ¶¶150, 154-56, 160-62. This false acknowledgement is a spoofed API message and is accordingly "emulating a network [API] message," consistent with the '541 patent's description of "emulating" as providing a spoofed API. EX-1015 ¶¶266-69; EX-1001, 97:55-98:5 (defining "emulating network API messaging" as "effectively providing a spoofed or emulated network API" or intercepting, modifying, and/or replacing various messages related to the network service activity). Rao's false acknowledgement technique is practiced in conjunction with its prioritization

methods, *supra* [1a]-[1g], such that the technique would be practiced as part of transmitting packets according to Rao's prioritization policy, EX-1015 ¶¶266-69.

**N. Claim 83**

**1. " . . . claim 1, wherein apply the policy comprises at least assist in intercepting . . . an application interface message."**

*Supra* [1f]-[1g], claim 79; EX-1015 ¶270.

**O. Claim 87**

**1. " . . . claim 1, wherein apply the policy comprises: identify a socket to be opened for the service usage activity; and based on a condition, block the service usage activity . . . ."**

Rao queues and communicates the intercepted network packets according to their priority. *Supra* [1g]; EX-1015 ¶¶271-79. To do so, Rao's remote access client may use a routing table with information "to identify a communication path or connection," including "a source IP address and a source port" and a "destination port." Rao ¶¶181, 192. The source port represents "the port by which an application . . . communicates on the network." *Id.* ¶181. The destination port is used by the peer device to communicate. *Id.* A POSITA would have understood that source and destination ports identify ports to be opened for the service usage activity, where the open ports permit communication of the packet. EX-1015 ¶¶271-79.

A POSITA would have further understood that a "socket" is a connection to a port, *id.* ¶¶271-79; EX-1009, 31-33, and that, by identifying ports, Rao also identifies sockets to be opened for the service usage activity (so that the packet can

be sent and received), EX-1015 ¶¶271-79. This is consistent with the '541 patent, which uses the term "socket" to refer to an "IP address, protocol, and/or port." *Id.*; EX-1001, 22:29.

Moreover, even if Rao did not expressly disclose identifying a socket to be opened, it would have been obvious for a POSITA to do so in view of Rao's disclosures related to source and destination ports and the relationship between sockets and ports. Rao ¶¶192, 112 ("the port monitored by the application 338 that originally generated the IP packet on the client 105"), 167 (describing transmission "by opening a specific TCP port"), 181; EX-1015 ¶¶271-79. The '541 patent uses "port" as an example of a "socket," confirming this understanding. EX-1015 ¶¶271-79.

Rao further discloses that, based on some conditions (e.g., a network disruption), it discards network packets, blocking them from being sent, which a POSITA would have understood blocks service usage activity. *Supra* claims 34, 80; EX-1015 ¶¶277-79. To the extent it is argued Rao's prioritization and discarding disclosures relate to different embodiments, it would have been obvious to implement them together. EX-1015 ¶¶66-67.

## P. Claim 88

### 1. "**. . . claim 1, wherein controlling the service usage activity comprises: . . . <u>modulating a number of access events or attempts associated with the first software component</u> . . . .**"

Rao intercepts and stores network packets associated with applications 338*a*-338*n* in queues 540*a*-540*n*. *Supra* [1b]-[1g]. One or more of Rao's intercepted network packets (e.g., one or multiple, each of which is a number) constitutes "a number of access events or attempts associated with the first software component" because the packets are associated with applications 338*a*-338*n* accessing or attempting to access network 104. Rao ¶¶87-89, 95, 179; EX-1015 ¶¶280-84.

After storing the packets, Rao assigns priority to them. Rao ¶¶180, 184-95, 40; *supra* [1f]-[1g]. Higher-priority packets are communicated before lower-priority packets. *Supra* [1e]-[1g]. This "modulat[es]" network packets because packets are selectively sent from the queues according to priority and not when first requested by an associated application. EX-1015 ¶¶280-84. Moreover, other factors, such as network congestion, may prompt "throttl[ing]" network packets—even those with a higher priority. Rao ¶195. This consideration of network congestion also teaches a policy that includes a prioritization policy that "modulat[es]" network packets. EX-1015 ¶¶280-84.

### Q. Claim 89

#### 1. "... claim 1, wherein ... the one or more processors[,] ... if it is determined that the service usage activity is not the background activity, refrain from applying the policy."

As discussed, *supra* [1d]-[1g], Rao teaches applying the policy (to deprioritize packets) ***if*** the service usage activity is the background activity. Thus, Rao discloses refraining from applying the policy (not deprioritizing packets) if it is determined that the service usage activity is not the background activity. EX-1015 ¶¶285-89.

If it is argued Rao does not disclose this, a POSITA would have been motivated and found it obvious to do so to further Rao's objectives, such as prioritizing active or foreground activity, improving efficiency and speed of the system, and minimizing user burden. *Id.*; *supra* [1f]-[1g]. Rao recognizes the benefits of doing so and that deprioritizing background activity relative to other applications can improve system efficiency. EX-1015 ¶¶285-89; Rao ¶3, 80.

### R. Claim 90

#### 1. "... claim 1, wherein the policy is a first policy, and wherein ... if it is determined that the service usage activity is not the background activity, apply a second policy."

Rao teaches this limitation. *Supra* [1e], [1f]-[1g] (applying a "first" de-prioritization policy if service usage activity is background activity), claim 89 (teaching not deprioritizing if the service usage activity is not the background activity); EX-1015 ¶¶290-93. Rao's de-prioritization policy is consistent with policies described in the '541 patent. EX-1001, claim 60 (noting a policy "allow[s],

restrict[s], delay[s], throttl[es], or prevent[s] the service usage activity"). Rao's de-prioritization policy constitutes restricting, delaying, or throttling the service usage activity. EX-1015 ¶¶290-93.

Rao further discloses, or at least renders obvious, a second policy of allowing packets of foreground activity (e.g., if the service activity is not the background activity) to be communicated without de-prioritization. *Id.*; EX-1001, claim 60 (reciting a policy that "allow[s]" the service usage activity). Not applying the policy if the service usage activity is not the background activity is a second policy. EX-1015 ¶¶290-93.

A POSITA would have understood that implementing such functionality as a single policy (e.g., with multiple aspects that deprioritize background activities but allow foreground activities to proceed unaltered) or as two separate policies (e.g., one that deprioritizes background activities and another that allows foreground activities to proceed unaltered) and the decision as to which approach to take was a simple design choice among known alternatives. *Id.* ¶293. Moreover, implementing this functionality as separate policies (as opposed to a single policy) is one of two possible approaches to the problem, and a POSITA would have had a reasonable expectation of success in using separate policies. *Id.*

### S. Claim 172

#### 1. "... claim 1, wherein the network element comprises ... a server ...."

Rao's gateway 340 teaches a network element. *Supra* [1e]. This gateway is a "remote access server." Rao ¶¶92-93, 1A-1C, 2A; EX-1015 ¶¶315-16.

## VIII. Ground 2: Rao-Fadell Renders Obvious Claims 1, 27, 30-33, 36-38, 40, 65-78, 153-154, and 173-174

### A. Motivation to Combine

It would have been obvious to combine Rao and Fadell, which disclose complementary methods for controlling network communications. EX-1015 ¶¶317-18; Rao ¶¶85-89, 97-105, 179-95, Figs. 5A-5B; Fadell ¶¶21-22, 47-72, Figs. 1, 3-6.

Like Rao's "remote access client," Fadell's "resource utilization component" monitors resource usage and notifies users when usage reaches a limit to avoid penalties. Fadell ¶¶16, 21-27, 47-72, Figs. 1, 3-6. Fadell's resource utilization component may enable, disable, cancel, delay, or reschedule network processes or communications based on, e.g., importance, type of data transferred, associated application or protocol, and/or resources available. *Id.*; EX-1015 ¶¶319-20.

A POSITA would have looked to Fadell to improve Rao given their similarities and benefits. EX-1015 ¶¶321-22. The combined system would apply a prioritization to network packets from a background activity and notify a user when resource usage approaches a threshold. *Id.* When the threshold is met in Rao-Fadell,

background activity network packets would be queued and deprioritized (Rao ¶¶180-95), and the user would be notified and given options to proceed (Fadell ¶¶47-72, Figs. 1, 3-6). EX-1015 ¶¶321-23. In one example, when a threshold (e.g., monthly data limit) is reached, the policy would cause the user to be notified and the system to intercept/queue background activity (e.g., email pulls, auto-update processes, RSS feeds). *Id.*

A POSITA would have been motivated to combine the functionalities of Rao and Fadell (including, e.g., those associated with Rao's remote access client and Fadell's resource utilization component) to deprioritize "low-priority" background activity, as both Rao and Fadell suggest, Rao ¶¶179, 182, 188-89, 192; Fadell ¶¶60, 64, 66, while providing the user information and options for how to proceed, as Fadell suggests, Fadell ¶¶47-72, Figs. 1, 3-6; EX-1015 ¶323. This would have minimized data-overage costs by rescheduling/delaying background activity near resource limits while providing the user with options for proceeding, e.g., by reducing resource usage, purchasing additional data, or switching networks. EX-1015 ¶¶323-26; Fadell ¶¶2-7, 16-18, 56-57, 63-65. Rao and Fadell contemplate cellular use, and Rao's prioritization would have benefited from Fadell's usage limits and notifications in this "pay to use" context. EX-1015 ¶¶323-26; Rao ¶¶198, 130; Fadell ¶¶2-7, 16-18, 23, 42-46.

Combining Rao and Fadell would have been nothing more than the simple combination of known elements to obtain predictable results. EX-1015 ¶¶327-28. For example, the combination of Fadell's resource usage thresholds and notifications with Rao's network packet prioritization techniques would have yielded the predictable result of a system that applies a prioritization of network packets associated with background activity and notifies the user when resource usage limits reach a threshold. *Id.* This also would have been nothing more than the use of the known techniques of monitoring resource usage limits and notifying the user to improve Rao in the same way and apply prioritization to background activity to avoid data overages. *Id.* A POSITA would have had a reasonable expectation of success in combining Rao with Fadell because both disclose monitoring network activity from handheld devices and mobile telephones and policies relating to associated network traffic. *Id.*

## B. Claim 1

### 1. [1a] "A non-transitory computer-readable storage medium storing machine-executable instructions that, when executed by one or more processors of a wireless end-user device, cause the one or more processors to:"

Rao teaches [1a]. *Supra* §VII.A.1.

Like Rao, *supra* §VII.A, Fadell's wireless end-user device may include "a cellular telephone," Fadell ¶¶29, 37. Fadell also discloses a "resource utilization component." *Id.* ¶31; EX-1015 ¶¶329-32.

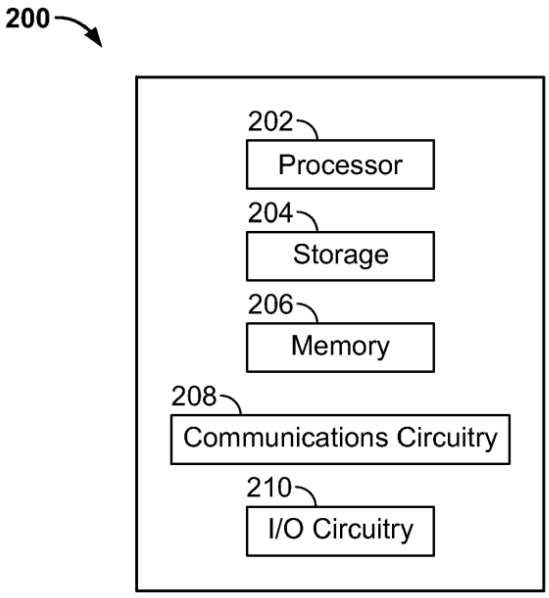


**FIG. 2**

Fadell, Fig. 2.

It would have been obvious to implement the Rao-Fadell device as a cellular phone or handheld computer that communicates over wireless (e.g., cellular) networks. *Id.* ¶¶29, 37. The Rao-Fadell device includes memory, storage, and a processor to execute stored instructions associated with the disclosed software/applications (e.g., Rao's remote access client 120 and/or Fadell's resource utilization component 110). EX-1015 ¶¶329-32. It would have been obvious to include functionalities associated with both Rao's remote access client 120 and Fadell's resource utilization component 110 in the combined instructions. *Id.* Rao explains that its policies are non-exclusive, Rao ¶182, and a POSITA would have

found it obvious to combine Rao's prioritization policies and Fadell's resource usage notification policies, EX-1015 ¶¶329-32; *supra* §VIII.A.

**2. [1b] "identify a service usage activity of the wireless end-user device, the service usage activity being associated with a first software component of a plurality of software components on the wireless end-user device,"**

Rao teaches [1b]. *Supra* §VII.A.2.

Like Rao, *supra* §VII.A, Fadell discloses data transfers to/from device 120 via wireless network 102 ("service usage activity of the wireless end-user device"), Fadell ¶¶17-22, 26-32, 46-47, 62, 71-72.

Like Rao, Fadell identifies service usage activity. To monitor and limit resource usage, Fadell's resource utilization component "identif[ies]" data requests and/or transfers (service usage activity). EX-1015 ¶¶333-37. This includes associating data requests and/or transfers with data types, applications, and/or protocols. Fadell ¶¶18, 56, 59-61, 64.

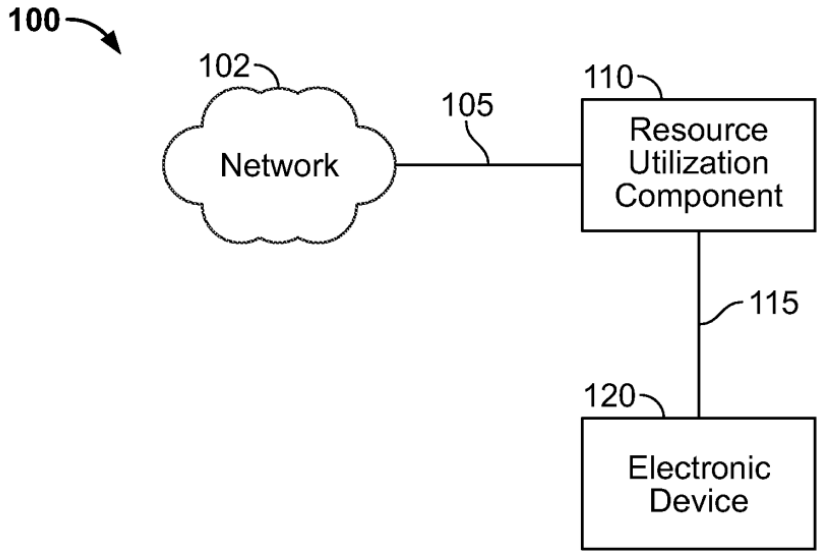


**FIG. 1**

*Id.*, Fig. 1.

Given these teachings, a POSITA would have been motivated to implement functionalities from both Rao's remote access client 120 and Fadell's resource utilization component 110 in the combined instructions to identify service usage activity in order to implement the Rao-Fadell policy. EX-1015 ¶¶333-37; *supra* §VIII.A.

### 3. [1c] "the service usage activity comprising one or more prospective or successful communications over a wireless network;"

Rao teaches [1c]. *Supra* §VII.A.3.

Like Rao, *supra* §VII.A, Fadell discloses that "[e]lectronic device 120 may connect to network 102 using . . . any suitable wired or wireless communications path," Fadell ¶28; EX-1015 ¶¶338-41. Fadell discloses that communications

between electronic devices 120 and network 102 may be routed through its resource utilization component, the functionality of which would have been incorporated with that of Rao's remote access client in Rao-Fadell. Fadell ¶¶27-28; *supra* §VIII.A.

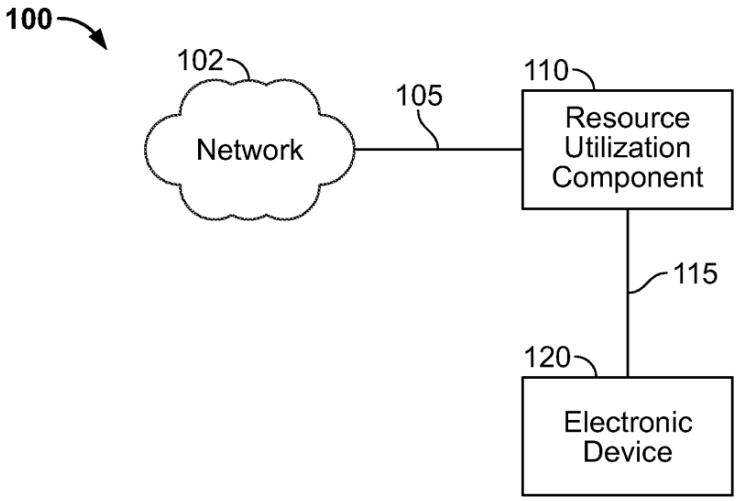


**FIG. 1**

Fadell, Fig. 1.

Fadell's resource utilization component monitoring device data requests and/or transfers to or from network 102 (service usage activity) discloses identifying service usage activity comprising prospective or successful communications over the wireless network. *Id.* ¶¶24-28, 46-47; EX-1015 ¶¶338-41.

#### 4. [1d] "determine whether the service usage activity comprises a background activity;"

Rao teaches [1d]. *Supra* §VII.A.4. Rao's teachings would have been implemented in Rao-Fadell to enable a policy that applies prioritization (e.g., a lower priority) as suggested by Rao and Fadell. *Supra* §§VII.A, VIII.A; EX-1015 ¶342.

**5. [1e] "determine at least an aspect of a policy based on a user input obtained through a user interface of the wireless end-user device or based on information from a network element,"**

Rao teaches [1e]. *Supra* §VII.A.5. Rao's teachings, including those associated with Rao's remote access client, would be incorporated into Rao-Fadell. *Supra* §VII.A; EX-1015 ¶343. To the extent it is argued Rao alone does not disclose this limitation, it would have been obvious to combine Rao and Fadell to provide a policy that specifies a prioritization for network packets and notifies a user when a resource usage threshold is reached. EX-1015 ¶¶344-50; *supra* §VIII.A.

Fadell discloses that a user may receive "reminders or alarms" that the user has reached a resource limit or threshold. Fadell ¶¶51-53, 48-50, 54-70. Fadell thus discloses a "policy" (e.g., providing notifications at a threshold) and an "aspect of a policy" (e.g., threshold value). EX-1015 ¶¶344-50.

Fadell determines the usage threshold and whether it has been reached based on (1) information regarding resource use from "a ***router or network component*** downstream" (network element) and/or (2) user-defined ranges (user input) provided via "component[s] for allowing a user to provide inputs" (user interface). Fadell ¶¶36-37, 50-51; EX-1015 ¶¶344-50. At least an aspect of the policy is based on the range/threshold (user input) or the resource use information (information from a network element). EX-1015 ¶¶344-50.

The Fadell policy notifies the user when a resource usage threshold is reached, and these notifications are thus based on the limit/threshold information received from the network element or user:

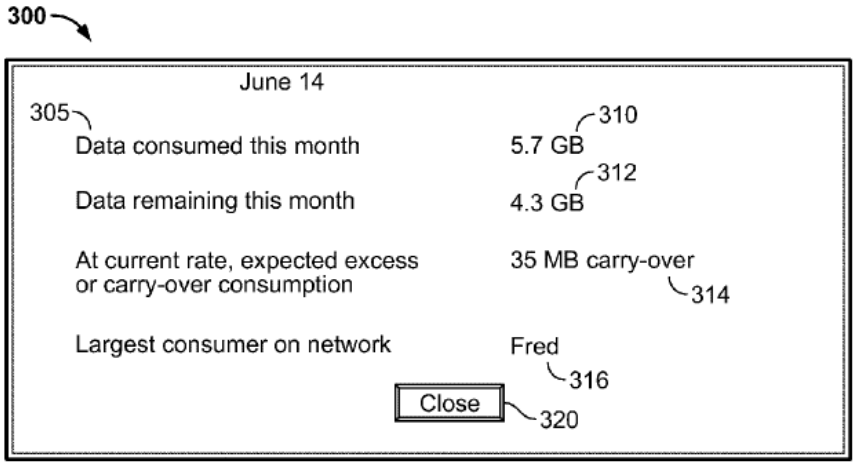


FIG. 3

Fadell, Fig. 3.

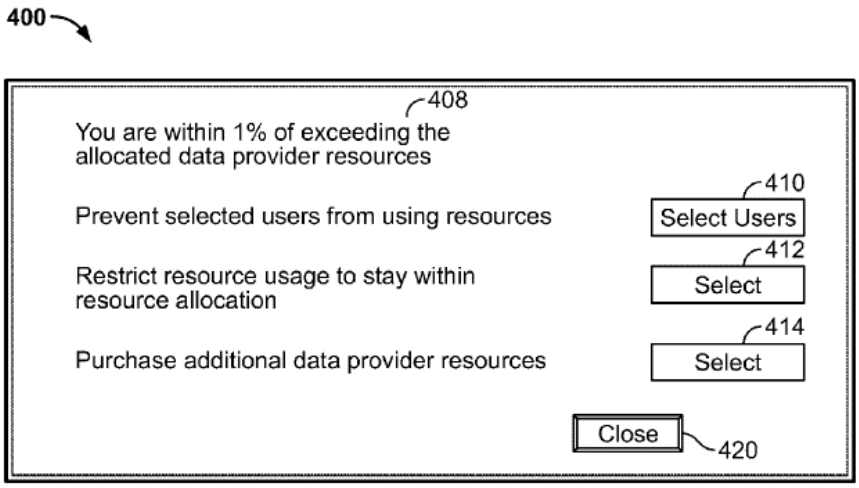


FIG. 4

*Id.*, Fig. 4.

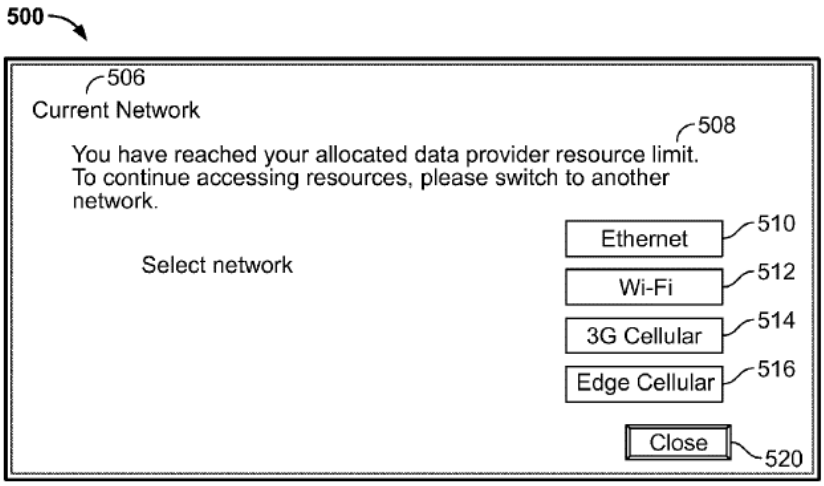


FIG. 5

*Id.*, Fig. 5, ¶¶50-70; EX-1015 ¶347.

For the reasons discussed, *supra* §VIII.A, a POSITA would have combined Rao and Fadell to provide a system with a policy that controls network activity and alerts a user when resource usage limits approach a threshold, implementing these features in Rao-Fadell, which discloses [1e]. A POSITA also would have combined Rao with Fadell for the reasons explained in Fadell: to "assist the consumer in avoiding excess fees or penalties[] the consumer may receive (e.g., from the data provider or from the resource utilization component)." Fadell ¶51; EX-1015 ¶¶348-49. This would have allowed a user to control resource usage, avoid overage charges, and prioritize foreground activity when resource usage limits are reached. EX-1015 ¶¶348-49.

**6. [1f] "the policy to be applied if the service usage activity is the background activity, the policy at least for controlling the service usage activity; and"**

Rao teaches [1f]. *Supra* §VII.A.6. Rao's teachings would be incorporated into Rao-Fadell. *Supra* §VII.A; EX-1015 ¶¶351-55.

To the extent it is argued Rao does not expressly disclose applying a policy "if" the service usage activity is the background activity, as discussed in Ground 1, it would have been obvious to modify Rao to apply a policy in this manner. *Supra* §VII.A.6; EX-1015 ¶¶351-55.

In the combined Rao-Fadell system, it would have been obvious to implement Rao's policy of assigning a priority to network packets based on the packets being background activity when a resource usage limit or threshold is reached and a user is notified, as taught by Fadell. Fadell ¶¶49-72, Figs. 3-6; EX-1015 ¶¶354-55. As discussed, *supra* §VIII.A, in Rao-Fadell, a POSITA would have been motivated to apply a lower prioritization to background activity and notify a user when a resource usage limit or threshold is reached to prevent inadvertent overages, reduce consumer costs, and provide Fadell's notifications that include options for proceeding. EX-1015 ¶¶354-55.

**7. [1g] "if it is determined that the service usage activity is the background activity, apply the policy."**

Rao teaches [1g]. *Supra* §VII.A.7.

In Rao-Fadell, it would have been obvious to apply Rao's prioritization to network packets determined to be background activity at least when a threshold is reached. EX-1015 ¶¶356-63; *supra* §VII.A.7 (explaining Rao's prioritization).

In doing so, it would have been obvious to apply prioritization (e.g., lower priority) to background activity packets and notify a user of data resources (e.g., via Fadell's screens 300-500) to enable the user to control how to proceed. Fadell ¶¶50-71, Figs. 3-6; EX-1015 ¶¶360-63. For example, a user may elect, as Fadell teaches, to "reschedule or cancel processes requesting data of lesser importance" via screen 400 and cause intercepted and/or future intercepted background activity packets to remain in a queue, as taught by Rao. Fadell ¶¶57-60; Rao ¶¶180-95; EX-1015 ¶¶360-63. A POSITA would have applied and/or modified Rao in this manner to prevent inadvertent overages and reduce costs for the consumer, and been motivated to do so for the reasons discussed above. *Supra* [1f] (Ground 2), §VIII.A; EX-1015 ¶¶360-63.

### C. Claim 27

#### 1. " . . . claim 1, wherein the policy is based on at least an aspect of a service plan."

The Rao-Fadell policy applies priority and issues notifications when the usage limit is reached. *Supra* [1e]-[1g] (Ground 2) (explaining combination and motivation for same), §VIII.A.

Fadell's usage limit is based on a data provider's "resource consumption tiers or plans," which provide a "particular amount of data resources . . . for a particular period." Fadell ¶¶43, 16-18, 44, 51, 53, 56-57, 63, 65, 70, 72. Fadell's resource consumption plan is a "service plan," and the resource usage limit on which the plan is based is an "aspect of the service plan." EX-1015 ¶¶374-79.

### D. Claim 30

#### 1. " . . . claim 1, wherein the wireless end-user device is part of a device group, and wherein the policy is associated with the device group."

Fadell's resource utilization component "manage[s] data transfers to different devices owned or operated by a same user" and allocates data resources on a user-by-user basis for use among devices. Fadell ¶¶67-69. "[D]evices owned or operated by a same user" constitute a device group at least because these devices share an allocation of data resources. *Id.* A POSITA would have understood that the "devices owned or operated by a same user" constitute a device group at least because these devices, as disclosed by Fadell, share an allocation of data resources. EX-1015 ¶¶380-83; Fadell ¶67; *supra* claim 21.

A POSITA would thus have been motivated to associate the Rao-Fadell policy with a group of user-owned devices. EX-1015 ¶¶384-85. The policy would apply to all the devices of that user (e.g., all the devices in the group), e.g., applying lower priority to background packets and notifying the user when the total data

consumption approaches the limit. *Id.* Applying the common policy to the group would (i) prevent inadvertent overages and reduce related costs, and (ii) effectively manage the data resources and identify any device overconsuming resources, as Fadell suggests. *Id.*; Fadell ¶¶69-70. A POSITA would have applied these teachings in Rao-Fadell with a reasonable expectation of success. EX-1015 ¶¶384-85.

### E. Claim 31

#### 1. "... claim 1, wherein the policy is based on a type of the wireless network."

Fadell discloses, e.g., ethernet networks, 3G and other cellular networks, EDGE networks, and Wi-Fi networks and teaches that data limits may differ "based on the particular network used" (i.e., by network type). Fadell ¶¶62, 44, 19, 64, Fig. 5. Fadell also suggests reserving background tasks (e.g., "receiving email") for particular types of networks. *Id.* ¶¶19, 64; EX-1015 ¶¶386-88. For example, "the consumer may have a large resource limit associated with [a] Wi-Fi connection, and no resource limit associated with [a] cellular connection." Fadell ¶62.

It would have been obvious to apply Fadell's teachings to Rao-Fadell and apply the prioritization and notification policy in a network-dependent manner. EX-1015 ¶389. For instance, a POSITA would have found it obvious to prioritize network packets associated with background activities and notify a user to avoid exceeding a low(er) resource usage limit associated with a first network, but not do so in other networks based on different resource limitations, as Fadell suggests. *Id.*

¶¶388-89; Fadell ¶¶19, 62, 64. A POSITA would have had a reasonable expectation of success in doing so. EX-1015 ¶389.

**F. Claim 32**

**1. "**. . . **claim 31, wherein the type of the wireless network is cellular** . . . **3G, [or]** . . . **wireless fidelity (WiFi)** . . . **."**

*Supra* claim 31; Fadell ¶¶44, 62; *also id.* ¶¶19, 64, Fig. 5; EX-1015 ¶¶386-92.

**G. Claim 33**

**1. "**. . . **claim 1, wherein the policy is based on . . . a cost associated with communicating over the wireless network** . . . **."**

Rao-Fadell bases its policy on a service plan limit. *Supra* [1e]-[1g] (Ground 2) (explaining combination and motivation for same), claim 27, §VIII.A. Fadell explains that users pay "a fixed fee" for consuming resources up to a certain limit or threshold and additional fees based on use of the wireless network "in excess of the limit" or threshold. Fadell ¶¶16, 18, 43, 51, 53, 57, 63, 65, 72; EX-1015 ¶¶393-95.

A POSITA would have been motivated to apply the policy in Rao-Fadell to "assist the consumer in avoiding excess fees or penalties" associated with exceeding a plan resource limit, as Fadell discloses. Fadell ¶51; EX-1015 ¶396. Indeed, Fadell discloses that its resource utilization component is capable of "perform[ing] utilization shifting actions" to help a user "manag[e] their usage under [data providers'] pricing mechanisms." Fadell ¶17; *also id.* ¶¶18, 51; EX-1015 ¶397. In applying the policy as Fadell teaches and suggests, the policy in the combined

system would be based on a cost associated with communicating over a wireless network. EX-1015 ¶¶396-97; *supra* §VIII.A.

### H. Claim 36

#### 1. [36a] " . . . claim 1, wherein the at least an aspect of the policy is based on the user input obtained through the user interface of the wireless end-user device, and"

*Supra* [1e] (Ground 2); EX-1015 ¶398.

#### 2. [36b] "wherein the user input identifies . . . a network type."

In Rao-Fadell, at least an aspect of the prioritization and notification policy is based on user input, *supra* [1e] (Ground 2), and it would have been obvious to modify Rao-Fadell to apply this policy in a network-dependent manner, *supra* claim 31; EX-1015 ¶¶399-400.

Further, Fadell's screen 500 provides users options to select various types of networks, including "Ethernet option 510, Wi-Fi option 512, 3G cellular network option 514 and EDGE cellular network option 516." Fadell ¶63.

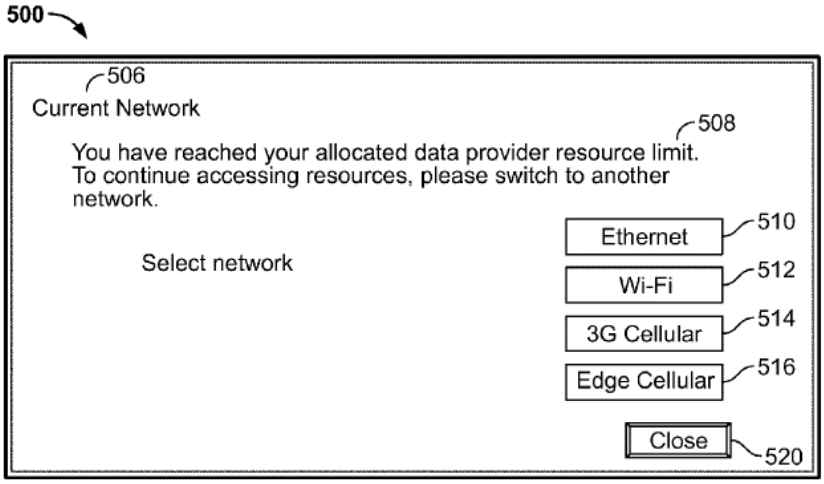


FIG. 5

*Id.*, Fig. 5.

Screen 500 also includes "any suitable information associated with each identified network," such as the "amount of resources available for each network" and "the penalty for exceeding the resources on each network." *Id*. A user's selection of a network type on screen 500 provides the user's preference for a specific network type. EX-1015 ¶401.

A POSITA would have found it obvious to modify Rao-Fadell to receive user input identifying a type of network (e.g., ethernet network, 3G or other cellular network, EDGE network, Wi-Fi network) to apply a network-dependent prioritization and notification policy in Rao-Fadell. *See* Fadell ¶¶19, 44, 62, 64, Fig. 5; *supra* claim 31; EX-1015 ¶401. This would have allowed a user to optimize use of network resources available on a given network. EX-1015 ¶401. Fadell's disclosures teach and suggests this, as Fadell's resource utilization component receives user selections of network types and automatically acts in response to those selections. Fadell ¶¶63-64, Fig. 5. In doing so, a POSITA would have found it obvious to deprioritize network packets associated with background activities and notify a user to avoid exceeding a low(er) resource usage limit associated with a first network, but not do so in other networks based on different resource limitations, as Fadell teaches and suggests. *Id.* ¶¶19, 62, 64; EX-1015 ¶401. Fadell itself teaches such a differential application of policies by noting that certain background tasks

(e.g., "receiving email") may be reserved for certain types of networks. *E.g.*, Fadell ¶¶19, 64. A POSITA would have had a reasonable expectation of success in the modification. EX-1015 ¶401.

## I. Claim 37

### 1. " . . . claim 1, wherein the policy is based on a usage limit or a threshold."

*Supra* [1e]-[1g] (Ground 2), claims 27, 33 (teaching a policy that prioritizes network packets and notifies a user when such a resource usage limit or threshold is reached), §VIII.A; EX-1015 ¶¶402-04; Fadell ¶¶16-19, 22, 42-45, 48-56, 58-59, 61-63, 71-72.

## J. Claim 38

### 1. [38a] " . . . claim 1, wherein the policy is based on a limit,"

*Supra* [1e]-[1g] (Ground 2), claim 37; EX-1015 ¶405.

### 2. [38b] "wherein the limit is based on <u>the user input</u> obtained through the user interface of the wireless end-user device, [or] . . . <u>an indication of a threshold</u> . . . ."

*Supra* [1e]-[1g] (Ground 2), claim 37 (teaching user input to specify the resource usage limit/threshold), §VIII.A; EX-1015 ¶¶406-08 (explaining that user input of a threshold constitutes an indication of a threshold); Fadell ¶51.

### K. Claim 40

#### 1. "**. . . claim 1, wherein the policy comprises one or more filters, wherein the one or more filters provide filtering based on: . . . <u>a service plan applicable to the wireless end-user device</u> . . . .**"

Rao's "agent 326 indicates the priority to the filter 322 for management of network packet queues 540*a*-540*n* to apply the indicated priorities." Rao ¶190; *also id.* ¶¶99, 190-91; *supra* [1b], [1g] (Ground 2) (explaining combination and motivation for same), §VIII.A.

In Rao-Fadell, the prioritization applied by the filter is based on a service plan applicable to the wireless end-user device. *Supra* [1g], claim 27; EX-1015 ¶¶409-14. Because a resource usage threshold associated with a service plan triggers the prioritization in Rao-Fadell, the filtering is based on a service plan applicable to the wireless end-user device. EX-1015 ¶¶409-14. A POSITA would have been motivated to implement Rao-Fadell in this way given Rao's teachings and would have had a reasonable expectation of success in implementing such a policy in Rao-Fadell. *Id.* ¶¶413-14; *supra* §VIII.A.

### L. Claim 65

#### 1. [65a] "**. . . claim 1, wherein the information from the network element is first information, and**"

*Supra* [1e] (Ground 2). A POSITA would have recognized the policies provided by or downloaded via gateway 340 (information from the network element) encompass "first information." EX-1015 ¶432.

### 2. [65b] "wherein apply the policy comprises provide second information to the first software component."

As part of applying the policy, Rao-Fadell issues a notification to the user when a resource usage threshold is reached. *Supra* [1b], [1f]-[1g] (Ground 2). These notifications may include options to, for example, exceed the threshold (e.g., by overriding the limit or purchasing additional resources) or "restrict[] resource usage to stay within the resource allocation," e.g., by rescheduling, canceling, delaying, slowing down, enabling, or disabling "processes requesting data of lesser importance." Fadell ¶¶53, 56, 58-62, 18, 52, 64, Fig. 4. The notifications may also allow the user to "switch" processes to different networks. *Id.* ¶¶64, 18-19, 62, 52, 62; EX-1015 ¶¶433-35.

In Rao-Fadell, it would have been obvious to apply Fadell's teachings regarding user options to, e.g., override, restrict, or switch networks to allow users to stay within their resource limits and provide users options to control their resource usage, as suggested by Fadell. EX-1015 ¶436. A POSITA would have recognized that a user's selection of an option to reschedule, cancel, delay, and/or switch a process of "lesser importance" (e.g., background activity) is "second information." *See* Fadell ¶¶60-61; EX-1015 ¶436.

A POSITA implementing Rao-Fadell would have been motivated and found it obvious to, when the user selected such an option, inform the application associated with the process being allowed (e.g., by an override), rescheduled, canceled,

delayed, switched, etc., of that instruction in order to ensure the application responded appropriately (e.g., continued sending packets, stopped sending packets, delayed sending packets, etc.). EX-1015 ¶437. A POSITA would have recognized that providing this information would avoid gaps and backlogs in Rao-Fadell's queues and would have allowed the applications to properly format and route packets associated with any processes switched to a different network. *Id.* ¶438.

Implementing Rao-Fadell in this way would have been no more than an exercise of routine skill. *Id.* ¶439. Both Rao and Fadell teach this type of intra- and inter-application communication, including via application programming interfaces (APIs), *e.g.*, Rao ¶¶106, 116, 190; Fadell ¶56, and a POSITA would have been familiar with how to facilitate such communications, particularly given that Fadell already teaches that applications may receive information in this manner, EX-1015 ¶439; Fadell ¶56; *also* Wyld, 7:30-33 (APIs can permit interactions between applications and other software components).

### M. Claim 66

#### 1. "... claim 65, wherein provide second information to the first software component comprises provide the second information through an application programming interface."

*Supra* claim 65; EX-1015 ¶¶440-43. A POSITA would have understood that communications between applications and other software components were routinely implemented via application programming interfaces, as Rao expressly

discloses. EX-1015 ¶¶442-43; Rao ¶¶106, 116, 190; Wyld, 7:30-33. A POSITA implementing Rao-Fadell as described, *supra* claim 65, would have recognized that APIs are among a finite number of known solutions for communicating information between system components and would have been motivated to implement Rao-Fadell to provide the second information to the software component via an API, EX-1015 ¶¶442-43.

### N. Claim 67

#### 1. "**. . . claim 65, wherein . . . the one or more processors . . . provide third information to a second software component on the wireless end-user device, the third information being different from the second information.**"

It would have been obvious to provide a second application 338*a*-338*n* (second software component) with "second information." *Supra* [65b]. Each of Rao and Fadell contemplates multiple applications, *see, e.g.*, Rao ¶38; Fadell ¶59, and Fadell teaches that its resource utilization component may take different actions with respect to different applications/processes, *e.g.*, Fadell ¶¶53, 56, 59, 60; EX-1015 ¶¶444-48. For the same reasons a POSITA would have found it obvious to provide "second information" to a first software component, it would have been obvious to, and a POSITA would have been motivated to, provide "third information" to a second software component to inform that component that its associated processes were, e.g., being allowed or resumed. EX-1015 ¶¶444-48; Rao ¶¶106, 116, 190;

Wyld, 7:30-33. A POSITA would have reasonably expected success in doing so. EX-1015 ¶¶444-48; *supra* [65b].

### O. Claim 68

#### 1. "**. . . claim 67, wherein provide third information to a second software component on the wireless end-user device comprises provide the third information through an application programming interface.**"

For the same reasons it would have been obvious to a POSITA to provide second information to the first software component via an API, it would have been obvious to a POSITA to provide third information to the second software component via an API. *Supra* claim 66; EX-1015 ¶¶449-52; Rao ¶¶106, 116, 190; Wyld, 7:30-33.

### P. Claim 69

#### 1. "**. . . claim 67, wherein the third information enables the second software component to communicate over the wireless network.**"

Rao-Fadell allows the user to opt to allow a communication (e.g., by overriding the limit or purchasing additional data). *See, e.g.*, *supra* claims 65, 67; Fadell ¶¶53, 59; EX-1015 ¶¶453-56. A POSITA would have understood that this may be "third information," as discussed, and would enable the second software component to communicate over the wireless network, e.g., by sending an API message confirming the socket. *Supra* claims 65, 67; EX-1015 ¶¶456-57.

### Q. Claim 70

#### 1. [70a] " . . . claim 65, wherein the wireless network is a first wireless network, and"

*Supra* [1c] (Ground 2) (disclosing "wireless network"). The "wireless network" constitutes a "first wireless network." EX-1015 ¶¶458-59.

#### 2. [70b] "wherein the second information comprises . . . a network availability state associated with the second wireless network, or information about the policy."

Rao-Fadell discloses second information including whether a particular process is being rescheduled, canceled, delayed, etc. *Supra* [65b]; EX-1015 ¶¶460-61. A POSITA would have understood this "second information" is information about the policy (e.g., that it is being applied). EX-1015 ¶¶460-61.

Rao-Fadell further discloses second information permitting switches "between available networks." *Supra* [65b]; EX-1015 ¶¶462-64; Fadell ¶¶64, 19, 62. A POSITA would have understood that an application whose processes were being redirected to a different network would need at least information identifying the target network, and this information would obviously indicate the availability state associated with the second wireless network. EX-1015 ¶¶462-64.

### R. Claim 71

#### 1. "... claim 65, wherein the second information comprises a setting for assisting the first software component in ... deferring [or] time-scheduling ... the service usage activity."

Rao-Fadell teaches that the second information may include that the application or process is being rescheduled. *Supra* [65b]; Fadell ¶¶60-62; EX-1015 ¶¶465-69. A POSITA would have understood a rescheduled process to be a deferred or time-scheduled service usage activity because the activity would occur at a later time than otherwise, and a POSITA would further have understood that the second information would obviously include details such as the time when the process should resume (a setting for assisting the first software component in deferring/time-scheduling as indicated). EX-1015 ¶¶465-69.

### S. Claim 72

#### 1. "... claim 71, wherein the setting is based on ... a time ...."

Rao-Fadell teaches that the second information would include the time the service usage activity is scheduled to resume, which is a setting for assisting the first software component in deferring/time-scheduling that is "based on" a time. *Supra* [65b], claim 71; EX-1015 ¶¶470-71.

## T. Claim 73

### 1. "... claim 1, wherein apply the policy comprises inform the first software component whether the first software component is allowed to access the wireless network."

Rao-Fadell informs applications 338*a*-338*n* that their background processes are being rescheduled, canceled, delayed, slowed down, enabled, disabled, and/or switched to other networks to remain within/below limits/thresholds. *Supra* [65b]. For example, depending on the resources available, a more important background process associated with an application 338*a* might remain enabled. *See* Fadell ¶60; *supra* claim 67. To avoid generating gaps in Rao-Fadell's queues, a POSITA would have ensured that application 338*a* received information indicating that it should start or keep sending network packets to remote access client 120. *Supra* Claim 67; EX-1015 ¶¶472-75.

A POSITA would have understood that the information received by application 338*a* in this scenario—which would enable it to communicate over network 104 (i.e., the wireless network)—would also indicate that the network was available and that the application was allowed to access it. EX-1015 ¶¶472-75 (citing [1c] (Ground 2); claim 67).

## U. Claim 74

### 1. "... claim 1, wherein apply the policy comprises inform the first software component whether the wireless network is available."

*Supra* claim 73; *also supra* claim 67, [65b]; EX-1015 ¶¶476-80; Fadell ¶60.

Rao-Fadell teaches informing applications 338*a*-338*n* that their associated background processes are being rescheduled, canceled, delayed, slowed down, enabled, disabled, and/or switched to other networks to remain within/below resource usage limits/thresholds. *Supra* [65b]. Moreover, Fadell teaches that its resource utilization component may switch between available networks, automatically and/or in response to user input, to avoid exceeding resource limits. *Supra* [70b]; Fadell ¶62.

It would have been obvious to apply Fadell's teachings to enable Rao-Fadell's users to optimize their resource usage within/below limits or thresholds, e.g., by switching from unavailable networks to available networks to avoid exceeding resource limits. EX-1015 ¶¶476-80; Fadell ¶¶19, 62, 64. It would have been obvious to inform an application 338*a*-338*n* that its processes were being switched to another network to remain within/below these limits and that the wireless network is not available (e.g., because the user is approaching or has approached the limit). EX-1015 ¶¶476-80. A POSITA would therefore have recognized that, in applying its prioritization and notification policy, Rao-Fadell would inform application 338*a*-338*n* whether the network was available. *Id.* ¶¶476-80.

## V. Claim 75

### 1. "... claim 1, wherein apply the policy comprises inform the first software component of a traffic control to be implemented or applied by the first software component."

Rao-Fadell teaches informing applications 338*a*-338*n* that their associated background processes are being rescheduled, canceled, delayed, slowed down, enabled, disabled, and/or switched to other networks. *Supra* [65b], claims 70, 74; EX-1015 ¶¶481-85. Rao-Fadell would have similarly notified applications 338*a*-338*n* whose processes were being redirected to other networks and provided information to facilitate reformatting and rerouting the network packets. *Supra* claims 65, 70, 74; EX-1015 ¶¶481-85.

A POSITA would have understood that information received by the applications 338*a*-338*n* in any of the above scenarios would have caused them to implement or apply one or more "traffic controls"—i.e., would have caused them to continue, stop, delay, or reschedule their sending of network packets or to reformat and reroute their network packets so that they could be transmitted over an alternate network. EX-1015 ¶¶481-85.

## W. Claim 76

### 1. [76a] " . . . claim 1, wherein the information from the network element is first information, and"

*Supra* [1e] (Ground 2). A POSITA would recognize the policies provided by or downloaded via gateway 340 (information from the network element) encompass "first information." EX-1015 ¶¶486-87.

### 2. [76b] "wherein apply the policy comprises obtain second information from the first software component."

Rao-Fadell teaches [76b]. Fadell explains that data resources are allocated on a per-user basis and the resource utilization component "manage[s] data transfers to different devices owned or operated by a same user." Fadell ¶¶67-69; *supra* claim 30. Fadell further discloses that "log-in or authentication information provided to access the network" may be used to identify "each user of the network" for purposes of determining the amount of resources available to the one or more devices (and enforcing any user-specific resource limits or thresholds). Fadell ¶67.

Users may supply this "log-in or authentication information" on an application-specific basis. *Id.*; EX-1015 ¶¶488-92. For example, a user could supply one set of log-in credentials to receive updates and send messages via an email application, and another set entirely to access certain websites. EX-1015 ¶¶490-92. Thus, two separate users could be logged into and accessing resources—e.g., through applications 338*a* and 338*b*, respectively—on the same device. *Id.*

A POSITA would have found it obvious to incorporate Fadell's teachings into Rao-Fadell by having the remote access client 120 obtain the application-specific login credentials (i.e., "second information") from application 338*a*-338*n* the user logged into when applying Rao-Fadell's user-specific resource management prioritization and notification policy to network packets associated with application 338*a*-338*n* running on a device. EX-1015 ¶¶491-92. This would have enabled confirmation that the user associated with the user-specific policy was indeed the one using the application 338*a*-338*n* so that the policy would not be improperly applied to another user (and either disrupt or permit network communications inappropriately based on the resource limits or thresholds applicable to that other user). *Id.* This would have ensured that resource usage was properly adjusted (as necessary) on a per-user basis. *Id.* This also would have required no more than the exercise of routine skill for a POSITA to implement given Fadell's suggestions to do so and the POSITA's general understanding that user-specific login credentials may be used to authorize or deny network access (e.g., access to the Internet). *Id.*; Freund, 22:1-6.

## X. Claim 77

### 1. "**. . . claim 1, wherein apply the policy comprises at least assist in . . . controlling . . . a notification associated with . . . the service usage activity, the notification for presentation through a user interface of the wireless end-user device.**"

In Rao-Fadell, when a resource usage limit or threshold is met, background network packets are intercepted, queued, and assigned a priority, as taught by Rao, and the user is provided a notification, as taught by Fadell. *Supra* [1e]-[1g] (Ground 2).

Providing a notification to a user, as taught by Fadell, obviously requires the system to "control[]" the notification (i.e., by preparing it for and presenting it to the user). EX-1015 ¶¶493-94.

The notifications described by Fadell are associated with the service usage activity. *Id.* ¶495. Fadell discloses that the notification may be "any suitable type of report, notice, reminder or alarm ***related to data provider resource consumption***," which a POSITA would have understood is the user's consumption of network resources by sending and receiving network packets. Fadell ¶49; *also id.* ¶¶29, 50, 55, 63, Figs. 3-5 (providing examples including information regarding "data consumed this month" and "data remaining this month"). A POSITA would have therefore understood that Fadell's notifications are associated with the network packets (the service usage activity), both given their content and because they are

provided when the user's service usage activity meets the resource limit or threshold. EX-1015 ¶¶494-95; *supra* [1a]-[1g] (Ground 2).

A POSITA would have understood Fadell's notifications are for presentation through the user interface of the wireless end-user device. Fadell teaches these "screens" are transmitted to the user and discloses display circuitry to display "device operation screens" as part of the device's input/output circuitry. Fadell, ¶¶36-39, 50; EX-1015 ¶¶496-97.

In implementing Rao-Fadell, a POSITA would have been motivated to cause the notification to be presented through a user interface of the wireless end-user device in view of Fadell's examples and its suggestion to do so. Fadell ¶¶39, 49-50, 54-58, 63-65, Figs. 3-5. Doing so would have transmitted the notification to the user, as suggested by Fadell, *id.*, and would have required no more than the exercise of routine skill for a POSITA to implement given both Rao's and Fadell's suggestions of a user interface, *supra* [1e] (Ground 2), and the ubiquity of such user interfaces at the time of the alleged invention, EX-1015 ¶¶496-500.

## Y. Claim 78

### 1. "**. . . claim 1, wherein apply the policy comprises at least assist in . . . <u>controlling</u> . . . a notification for presentation through a user interface of the wireless end-user device.**"

Rao-Fadell discloses that applying the policy comprises at least assisting in controlling a notification, and Rao-Fadell further discloses that the notification is for

presentation through a user interface of the wireless end-user device. *Supra* claim 77; EX-1015 ¶¶501-02.

**Z. Claim 153**

**1. [153a] " . . . claim 1, wherein the at least an aspect of a policy is based on the user input obtained through the user interface of the wireless end-user device, and"**

*Supra* [1e] (Ground 2); EX-1015 ¶701.

**2. [153b] "wherein the user input specifies a user preference associated with one or more network types."**

*Supra* [1e], claim 31; EX-1015 ¶¶702-05. A user's selection of a network type is based on that user's preference for the selected network type. Fadell ¶63, Fig. 5; EX-1015 ¶¶705-06.

**AA. Claim 154**

**1. " . . . claim 153, wherein the one or more network types comprise wireless fidelity (WiFi), [or] . . . 3G . . . ."**

*Supra* [153a] (user input providing a user preference specifying a network type, including a WiFi network or 3G cellular network); Fadell ¶63; EX-1015 ¶¶707-09.

**BB. Claim 173**

**1. " . . . claim 1, wherein . . . the one or more processors . . . provide information about the service usage activity to the network element."**

Rao discloses that it communicates network packets from the prioritization queues via gateway 340 (network element). Rao ¶¶194, 93; *supra* [1e]. Rao's user

device transmits packets with information about those packets, including, e.g., "the IP address of the packet," "connection-specific data," and "special feature request[s]." Rao ¶94. Rao's IP address, connection-specific data, and special feature requests are each information about the service usage activity provided to the network element (e.g., the gateway). EX-1015 ¶¶795-98.

### CC. Claim 174

#### 1. "**. . . claim 173, wherein the information about the service usage activity comprises . . . <u>a classification of traffic</u> . . . [or] <u>a parameter associated with the service usage activity</u> . . . .**"

*Supra* claim 173. Rao's IP address, "connection-specific data," and "special feature request[s]" are each examples of "information about the service usage activity" that are at least a "classification of traffic" and a "parameter associated with the service usage activity." EX-1015 ¶799.

## IX. Ground 3: Rao-Freund Renders Obvious Claims 29 and 84-86

### A. Motivation to Combine

Rao and Freund disclose complementary methods of classifying and controlling network communications. EX-1015 ¶¶800-06. Like Rao, Freund monitors network communications and distinguishes between foreground and background activity. Freund, 14:51-21:50, 8:63-9:3, 10:16-43. Freund maintains a list of actively used processes to "determine if [a] process . . . should have access to the Internet." *Id.*, 4:5-5:5. This enables the system to "monitor TCP/IP activities on

a per process or per application basis." *Id.* Freund, like Rao, discloses a system with a "client-side filter." *Id.*, 3:36-4:4; Rao ¶180.

A POSITA would have combined Freund's and Rao's teachings given their similarities. EX-1015 ¶¶800-06. A POSITA would have been motivated to make this combination, for example, in environments where an employer may measure productivity and monitor user devices (e.g., on an employer network or employer user device), as Freund suggests. Freund, 8:63-9:3, 10:16-43. In these environments, it is necessary to accurately characterize active and background activities. *Id.* In Rao-Freund, actively used applications would be tracked, as Freund discloses, and applications not in use would be classified as background activity. EX-1015 ¶¶804, 807-09. This would have enabled accurate measurement of application/Internet use and ensured only those applications not in active use are prioritized according to Rao's policies. *Id.* ¶¶807-09. This would have involved nothing more than combining known elements in the prior art according to understood principles to yield predictable results. *Id.* ¶809.

### B. Claim 29

#### 1. "**. . . claim 1, wherein the policy is based on <u>a user interaction with the first software component</u> . . . .**"

Rao-Freund teaches this limitation.

Rao's policies 520 "define prioritization" for network packets "based on [determining] whether an application [associated with the network packets] is

running in the foreground or the background of the client 105." Rao ¶¶182, 38-43, 180, 188-89, 191, 193, Figs. 5A-5B; *supra* §§VII.A.d, VII.A.g. The "application[s] . . . running in the foreground" are "currently in active use by the user," whereas applications running in the background are not being actively used. Rao ¶¶3, 182, 188, 133, 140, 210, 118, 126. Thus, Rao discloses determining and applying a policy that assigns a specific priority (e.g., a lower priority) to network packets associated with application(s) 338*a*-338*n* (first software component) running in the background of client 105—application(s) a user is not actively interacting with—as opposed to assigning higher priorities to packets associated with application(s) that a user is actively interacting with in the foreground. EX-1015 ¶¶811-12; *see supra* §VII.A.e-f. Alternatively, it would have been obvious that a user's interaction with the application (or lack thereof) will ultimately dictate whether the application constitutes a background application and the related priority assignment. EX-1015 ¶813.

Freund also discloses a method for determining when an application is being "actively" used for purposes of distinguishing between foreground and background activities and taking appropriate actions. Freund, 3:12-16, 3:42-48, 8:63-67, 10:17-37. Specifically, it explains that an application "can be examined for determining whether it is 'active' by determining whether the application receives 'focus' and/or receives user input," *id.*, 10:37-43, and provides an exemplary method for detecting

whether a user is interacting with an application, *id.*, 30:11-49, 6:7-14, Figs. 13A-13B. If user interaction with the application is detected, the application is classified as a foreground application, and all related activities associated with the application constitute foreground activities. *Id*. All other activities would constitute background activities. *Id.*; EX-1015 ¶814.

A POSITA would have been motivated and found it obvious to combine Rao and Freund to produce a system that determines and applies a policy assigning a specific priority (e.g., a lower priority) to network packets that were associated with passively used applications 338*a*-338*n*. *Supra* §VII.A.e-f. A POSITA would have been aware of the latency- and quality-related issues that could arise when network packets for passively used applications (i.e., background applications) are processed ahead of packets for applications "currently in active use by the user" (i.e., foreground applications). EX-1015 ¶815; Rao ¶3; Oestvall ¶6. To mitigate such issues, it would have been effective to base Rao's prioritization policy on whether an application is actively used, i.e., whether a user is interacting with the application and end-user device, which is consistent with the '541 patent's disclosures. EX-1015 ¶¶815-17; EX-1001, 14:47-51, 96:44-48, 90:65-91:16. With Freund's methodological guidance, a POSITA would have been able to implement such a policy with a reasonable expectation of success. EX-1015 ¶815.

### C. Claim 84

#### 1. [84a] " . . . claim 1, wherein apply the policy comprises: at least assist in preventing initiation of the service usage activity by the first software component; and"

Rao teaches that remote access client 120 may intercept outbound packet traffic associated with application 338 establishing a TCP connection. Rao ¶166 ("first packet . . . generated by an application program . . . is intercepted by a filter process 322 before it reaches the network stack"), Fig. 3A-3C; *id.* ¶111 ("The remote access client 120 may intercept or capture the IP packets generated by the application 338."). A POSITA would have understood this "first packet" initiates a service usage activity by the first software component. EX-1015 ¶¶864-65.

Rao's remote access client 120, upon intercepting these packets, "may identify an application 338 that generated the [network] packet[s]" associated with the attempt to establish the TCP connection and "make a policy-based determination" regarding whether and how the packets should be transmitted "responsive to the identified application 338." Rao ¶109. Rao's intercepted network packets are also prioritized in accordance with policies 520, queued in accordance with the assigned priorities, and communicated across the network "in a manner according to or consistent with the determined priorities." *Id.* ¶¶191, 194; *supra* §VII.A.e-g. Additionally, remote access client 120 may "discard" some or all

network packets "after a predetermined period of time" based on policies 520 to "reduce latency and quality issues." Rao ¶207; EX-1015 ¶866.

A POSITA would have found it obvious to combine these disclosures to intercept initial network packets associated with a background application's establishment of a TCP connection (an initiation of a service usage activity) and then prioritize, queue, and ultimately discard them, if necessary, to avoid latency- and quality-related issues and reduce network congestion. EX-1015 ¶867; *supra* claims 34, 80. Moreover, to the extent it is asserted that Rao's disclosures regarding transmitting network packets associated with initiating TCP connections are distinct embodiments from Rao's application-specific prioritization, queuing, and discarding policies, *see* Rao ¶¶108, 182, 207, a POSITA would have been motivated to combine them based on Rao's express invitation, *see id.* ¶218; EX-1015 ¶867. This would enable more granular control over network packet transmission (and timing thereof) and achieve Rao's purposes of managing network communications based on policies 520 and in view of network statistics or other factors, like congestion. Rao ¶195. Doing so would have been an exercise of routine skill for a POSITA. EX-1015 ¶867.

A POSITA would have understood that the resulting Rao-Freund system, capable of discarding network packets associated with an application's TCP connection establishment, would prevent initiating the service usage activity by the application. *Id.* ¶868.

**2. [84b] "send a message to the first software component."**

Freund's client monitor "redirect[s] [a] user to an error page" or "generat[es] an application error" upon the occurrence of an "attempted rule violation." Freund, 26:52-58. An attempted rule violation occurs when an application attempts to access the Internet despite a rule prohibiting such access; when this occurs, the client monitor prevents the Internet access and/or warns the user. *Id.*, 5:61-64. Freund's rules may also temporarily "[d]isable Internet [a]ccess for non-critical [a]pplications or protocols" (e.g., Rao's background applications or activities) to manage, e.g., network congestion. *Id.*, 30:51-67. A POSITA would have recognized that Freund's monitor redirecting and/or warning the user or generating an application error would include sending a message to the application. EX-1015 ¶¶869-71.

A POSITA would have been motivated and found it obvious to apply these teachings of Freund in Rao-Freund to send a message to background application 338*a*-338*n* and cause it to warn or redirect a user to an error page and/or generate an application error if the system was to discard network packets associated with the application's TCP connection establishment. *Id.* ¶¶871-72. This would have allowed background application 338*a*-338*n* to inform the user that the application would not be permitted to initiate the service usage activity at that time to avoid latency- and quality-related issues and mitigate network congestion. *Id.* This would have been routine for a POSITA, who would have understood how to facilitate communication

between remote access client 120 and application 338*a*-338*n*, *see, e.g.*, Rao ¶¶106, 116, 190; *see also* Wyld, 7:30-33, particularly given that Freund already teaches that applications may receive information sufficient to permit them to redirect users to error pages and/or generate application errors, *see* Freund, 26:52-58; EX-1015 ¶872.

### D. Claim 85

#### 1. "**. . . claim 84, wherein initiation of the service usage activity by the first software component comprises . . . <u>initiating a data flow</u>, or <u>initiating a data stream</u>.**"

Rao-Freund teaches "initiation of the service usage activity by the first software component" based on initial network packets associated with establishing a TCP connection. *Supra* [84a]. A POSITA would have recognized that a TCP connection would have constituted a "data flow" or "data stream" and that establishing a TCP connection would have constituted initiating a data flow or data stream. EX-1015 ¶¶873-76. For example, Rao discloses that its TCP connection transmits network packets between a target computing device and application 338, and it discusses in detail how network packets associated with establishing a TCP connection are exchanged. Rao ¶¶109-11. A POSITA would have recognized that this transmission of network packets between application 338 and a target computing device would have constituted a data flow or data stream, and that the attempt to establish a TCP connection therefore would initiate a data flow or data stream from application 338 to the second computing device or gateway 340. EX-1015 ¶876.

### E. Claim 86

#### 1. "**. . . claim 84, wherein the message comprises . . . <u>an indication that the service usage activity is not allowed</u> . . . .**"

In Rao-Freund, a message is sent to application 338*a*-338*n*, which causes it to redirect a user to an error page and/or generate an application error in the event the system was required to discard network packets associated with establishing a TCP connection. *Supra* [84b]. This message would have informed the user that the application would not be permitted to access the network at that time and, thus, would have presented an indication that the service usage activity (e.g., the process(es) of background application 338*a*-338*n*, which were associated with the discarded network packets, *supra* [84b]) would not be allowed. EX-1015 ¶¶877-79.

## X. 35 U.S.C. § 314

The Board should not deny institution under the *Fintiv* factors based on the Related Matters identified below. That Petitioner Google is not a party to the Related Matters favors institution under all factors, and particularly Factor 5. For all other Petitioners, the statuses of the Related Matters (Factors 1-4) are either neutral or favor institution.

Factor 1 is neutral. Factor 2 favors institution. The first trial in any Related Matter is May 19, 2025. Further, the trial date is not determinative particularly because, in EDTX, multiple trials are commonly scheduled on the same date.

Factor 3 favors institution. The first Markman hearing is not until November 19, 2024, and completion of discovery and dispositive motions all follow institution. EX-2018, 4. Petitioners diligently brought this challenge approximately 6 months after receiving contentions *for all 174 claims*. *CoolIT Sys., Inc. v. Asetek Danmark A/S*, IPR2021-01195, Paper 10 at 11-14 (PTAB Dec. 28, 2021).

Factor 4 favors institution. This Petition challenges 50 claims, which will likely be greater than the number of claims tried. EX-1017 ¶¶3-4. Moreover, Patent Owner asserts the patent in multiple litigations, and resolving invalidity questions here would mitigate duplicative efforts.

If Factor 6 is considered, the compelling merits of this petition outweigh any concerns that might arise under Factors 1-5. Petitioners rely on prior art that the Office never applied, present significantly different invalidity grounds, and rely on Dr. Wolfe's declaration explaining each claim's invalidity.

## XI. 35 U.S.C. § 325

These grounds were not previously considered by the Office. Rao and Freund were not before the Examiner, and he did not discuss Fadell, which was submitted with over 700 references. After just one rejection, the independent claim was rewritten, all 173 dependent claims were added, and the claims were allowed after a minor amendment with only a conclusory supporting rationale. EX-1015 ¶¶42-46.

## XII. MANDATORY NOTICES UNDER 37 C.F.R. § 42.8

### A. Real Party-in-Interest

Google LLC,[1] Cellco Partnership d/b/a Verizon Wireless, Verizon Corporate Services Group Inc., T-Mobile USA, Inc., Sprint LLC f/k/a Sprint Corp., AT&T Services, Inc., AT&T Mobility LLC, and AT&T Enterprises LLC[2] are the real parties-in-interest for this petition.[3]

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[1] Google LLC is a subsidiary of XXVI Holdings Inc., which is a subsidiary of Alphabet Inc. XXVI Holdings Inc. and Alphabet Inc. are not real parties-in-interest to this proceeding.

[2] Related-Matter Defendant AT&T Corp. has undergone a corporate transaction and is now merged and converted into AT&T Enterprises, LLC.

[3] Defendant-Petitioners Cellco Partnership d/b/a Verizon Wireless, Verizon Corporate Services Group Inc., T-Mobile USA, Inc., Sprint LLC f/k/a Sprint Corp., and AT&T Services, Inc. also acknowledge that each petitioner has a number of affiliates and state that no unnamed entity is funding, is controlling, or otherwise has an opportunity to control or direct this Petition or their participation in any resulting IPR. Defendant-Petitioners Cellco Partnership d/b/a Verizon Wireless, Verizon Corporate Services Group Inc., T-Mobile USA, Inc., Sprint LLC f/k/a Sprint Corp.,

### B. Related Matters

The '541 patent is, or has been, involved in the following proceedings:

| Name | Number | Forum | Filed |
|---|---|---|---|
| *Headwater Research LLC v. Verizon Communications Inc.* | 2:23-cv-00352 | E.D. Tex. | Jul. 28, 2023 |
| *Headwater Research LLC v. AT&T Inc.* | 2:23-cv-00397 | E.D. Tex. | Sept. 1, 2023 |
| *Headwater Research LLC v. AT&T Inc.* | 2:23-cv-00398[4] | E.D. Tex. | Sept. 1, 2023 |
| *Headwater Research LLC v. T-Mobile US, Inc.* | 2:23-cv-00377[5] | E.D. Tex. | Aug. 21, 2023 |
| *Headwater Research LLC v. T-Mobile US, Inc.* | 2:23-cv-00379 | E.D. Tex. | Aug. 21, 2023 |

### C. Lead and Backup Counsel Information

Petitioners provide the following designation of counsel:

| Lead Counsel | Back-Up Counsel |
|---|---|
| Erika H. Arner (Reg. No. 57,540)<br>erika.arner@finnegan.com<br>Finnegan, Henderson, Farabow, Garrett & Dunner, LLP<br>1875 Explorer Street<br>Suite 800<br>Reston, VA 20190-6023 | Daniel C. Tucker (Reg. No. 62,781)<br>daniel.tucker@finnegan.com<br>Alexander M. Boyer (Reg. No. 66,599)<br>alexander.boyer@finnegan.com<br>Finnegan, Henderson, Farabow, Garrett & Dunner, LLP<br>1875 Explorer Street<br>Suite 800 |

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and AT&T Services, Inc. are also not aware of any affiliate that would be barred from filing this Petition under 35 U.S.C. § 315(e).

[4] The -00398 case has been consolidated with the -00397 case.

[5] The -00377 case has been consolidated with the -00379 case.

| | |
|---|---|
| Tel: 571-203-2700; Fax: 202-408-4400 | Reston, VA 20190-6023<br>Tel: 571-203-2700; Fax: 202-408-4400<br><br>Cara E. Regan (Reg. No. 70,209)<br>cara.regan@finnegan.com<br>Finnegan, Henderson, Farabow, Garrett & Dunner, LLP<br>901 New York Ave. NW<br>Washington DC, 20001<br>Tel: 202-408-4000; Fax: 202-408-4400<br><br>Patrick D. McPherson (Reg. No. 46,255)<br>PDMcPherson@duanemorris.com<br>DUANE MORRIS LLP<br>901 New York Ave. NW<br>Suite 700 East<br>Washington, DC 20001<br>Tel: 202-776-7800; Fax: 202-776-7801<br><br>Kevin P. Anderson (Reg. No. 43,471)<br>KPAnderson@duanemorris.com<br>DUANE MORRIS LLP<br>901 New York Ave. NW<br>Suite 700 East<br>Washington, DC 20001<br>Tel: 202-776-7800; Fax: 202-776-7801 |

In concurrently filed Powers of Attorney, Google LLC has granted Power of Attorney to Practitioners at Finnegan, Henderson, Farabow, Garrett & Dunner, LLP, and Cellco Partnership d/b/a Verizon Wireless, Verizon Corporate Services Group Inc., T-Mobile USA, Inc., Sprint LLC f/k/a Sprint Corp. and AT&T Services, Inc. have granted Power of Attorney to Practitioners at Duane Morris LLP.

Petitioners consent to service by email at the addresses listed above and Headwater-541-IPRs@Finnegan.com, PDMcPherson@duanemorris.com, and KPAnderson@duanemorris.com.

## XIII. CONCLUSION

Petitioners respectfully request that the Board grant IPR and find all challenged claims unpatentable.

Dated: June 7, 2024

By: /Erika H. Arner/
Erika H. Arner (Reg. No. 57,540)

**CERTIFICATE OF COMPLIANCE**

Pursuant to 37 C.F.R. § 42.24(a)(1)(i), the undersigned hereby certifies that the foregoing PETITION FOR *INTER PARTES* REVIEW OF U.S. PATENT NO. 8,589,541 contains 12,598 words, excluding parts of this Petition exempted under § 42.24(a), as measured by the word-processing system used to prepare this paper.

Dated: June 7, 2024

/Daniel C. Tucker/
Daniel C. Tucker (Reg. No. 62,781)
Counsel for Petitioner

# CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. §§ 42.6(e) and 42.105(a), the undersigned certifies that on June 7, 2024, a copy of the foregoing **Petition for *Inter Partes* Review**, **the associated powers of attorney**, and **Exhibits 1001-1018, and 1020-1022** were served by FedEx Priority Overnight on the correspondence address of record indicated in the Patent Office's public Patent Center system for U.S. Patent No. 8,589,541:

Dr. Greg Raleigh
Headwater Research LLC
110 North College Avenue, Suite 1116
Tyler, TX 75702

Dated: June 7, 2024

By: /William Esper/
William Esper
Case Manager and PTAB Coordinator
Finnegan, Henderson, Farabow,
Garrett & Dunner, L.L.P